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The aims of the Society as stated in the constitution are 'to promote and stimulate the study of geography'. These are the aims of more than one Society in the world and the New Zealand Geographical Society is particularly concerned with geography in New Zealand. It is therefore the Society's policy to stimulate geographic studies of New Zealand and matters closely related to the Dominion.

The Society undertakes the publication of a journal which at present appears twice a year. Branches of the Society organise lectures, study groups, and excursions, and encourage their members to prepare matter for publication in the Society's journal, the *New Zealand Geographer*. Contributions from overseas writers and those who are not members of the Society are also encouraged.

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New Zealand Geographer

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GEOGRAPHY AND THE COMMUNITY*

R. OGILVIE BUCHANAN

IT MAY BE taken as one of the lasting verities that geography, to Aristotle the mother of the sciences, has a perennial interest for ordinary men and women. Their ideas of the nature and limits of the subject may lack precision, they may be indifferent to the more technical problems and philosophical implications, but they never quite lose sight of the fact that the raw materials of the subject are the facts of earth and man with which they are in daily contact as a large, if not dominant, element of their total environment. Yet the systematic study of the subject in the institutions of higher education has suffered periods of eclipse, amounting almost to oblivion. The most recent of such periods, the later nineteenth century and the earlier twentieth, came in the train of the nineteenth century outburst of activity in the biological and the physical sciences, which opened up great vistas of advance in the individual natural sciences, but which had also the unfortunate effect of reducing the prestige of those scientific studies that did not proceed by way of rigidly controlled experiment in ever narrowing specialisms.

An auspicious start in the revival of the subject in Britain was made in 1884 with the appointment of H. J. Mackinder at Oxford; but progress was slow, and by 1914, although several university departments of geography had been founded, there existed only one full university chair in the subject. The stimulus of the first world war, however, led to rapid development after 1918, and in a very few years every university had a department of geography, and most of them had chairs. New Zealand in its isolation lagged, and it is only in the last decade that any provision has been made for the independent development of the subject, and only since the end of the second world war that Auckland, Wellington and Otago have followed the lead of Canterbury and founded departments of geography. Already a significant output of original work of no small merit testifies to the enthusiasm and the competence of the professional geographers, while large classes at all stages give a measure of the demand for undergraduate training. It was university initiative, too, that led to the institution of the New Zealand Geographical Society which has provided a focus for the widespread but previously unorganised and inarticulate interest throughout the general community. It is particularly gratifying that the *New Zealand Geographer* has supplied an outlet for publication by members who would be too modest to claim the title of geographers, but who have proved themselves capable of making useful contributions to the geographical literature of the country. It may be not inappropriate, then, at this stage, when the subject has got well on its feet and is facing the future with confidence, to consider some of the implications and results of the relationship between the subject and the community, more particularly in the light of the longer history of development in Great Britain.

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*An address delivered at the fourth annual meeting of the society held in Auckland on 8 June, 1948.

The Place of the University Geographer

In attempting such a survey it is convenient to start with the university geographer, since the twofold character of his work gives him a pivotal position, both in his subject and amongst the community. As researcher he is concerned with the discovery and assessment of new material, with the invention of new and the refining of old techniques, and with the critical re-examination of accepted views. It is in the performance of this function that he forms the growing point of his subject and keeps it living and vigorous. The effect may be seen either in the direct professional value of the conclusions he reaches in the problems he investigates, or in the stream of ideas he sends flowing out to the community beyond the university walls. It must be noted, however, that in his capacity as teacher he is concerned not merely with the purveying of facts or ideas. His real task is the guidance of the student in the acquisition of techniques and the development of judgment, a much more exacting (and satisfying!) business than the mere retailing of information. To the extent that he succeeds in this aspect of his work he is constructing channels capable of carrying his influence out to the lay public; but only so far as his teaching is kept fresh and stimulating through the interest of his own original work will these channels carry a full flow of fertilising ideas.

What has just been said of the position of the geographer conveys nothing about the nature of the subject in which he does his work, and the implication that the nature of the subject requires no explanation is perhaps unsafe. It may, therefore, be advisable to state explicitly a few simple propositions that will form the basis on which the later argument will be developed. The first is that geography is concerned with the face of the earth, that is to say the landscape. The second is that the landscape includes both natural elements and the works of man. The third is that both these sets of phenomena are the result of processes of growth or development, and that the picture presented by the landscape is a momentary 'still' from a film of continuous change. The fourth is that the aim of the geographer is the understanding of this complex entity.

If these four propositions are agreed upon, there will be no difficulty in accepting the corollary that the study itself is an evolutionary study, and that real understanding can come only from a knowledge of how the landscape in question acquired its present characteristics. It follows, too, that an essential part, if not indeed the major part, of the work must be done in the field. It is in the field that the mature geographer must look for the evidence on points critical to the solution of his problem. It is in the field that the student sees demonstrated the application of tested methods, and learns to develop what may be called, in not too narrow a sense, his 'eye for country'. Let it be added immediately that there is no reason at all why fieldwork should not begin in the school geography course, and much reason why it should. In the field is found the concrete reality that appeals so readily to the young and that is often so conspicuously lacking in the abstractions of the textbook.

An Understanding of the Landscape

This 'eye for country', then, can to a greater or smaller degree be diffused among the nonprofessional community, and to the degree that it is acquired by the individual it adds a new and stimulating interest to his view of the phenomena of landscape around him. The volcanic cones that are so conspicuous an element in the charm of Auckland betray much of the debt the 'Queen City' owes as port and metropolitan centre for half the area of the North Island and a third of the population of New Zealand to the fact and the nature of crustal disturbances of bygone times. The Waitomo Caves, with their great vaulted roofs, their majestic columns of opposing stalactite and stalagmite, and the fairyland reflection of their myriad glow-worm lights in the water below, unfold and illustrate a story of process and development still going on. The yawning chasms of the glacial canyons of the Clinton and the Arthur rivers between Lake Te Anau and Milford Sound, or the ranges and basins of North Canterbury, with their juxtaposition of stark, resistant greywacke ranges, the softer forms of their fringing tertiary hills and the serried terrace levels of the wide, shingle-filled depressions, are serial documents preserving in their form successive chapters of growth and destruction, documents of which even the novice can read something and add a touch of intellectual satisfaction to his aesthetic appreciation. The green dairy pastures clothing the lower, gentle slopes of Mount Egmont; the great unfenced expanses of sparse, dull tussock in the Canterbury high country; the bare, scabweed-infested hills of parts of the dry Central Otago country; the abandoned holdings in the back country of Wanganui and of the East Coast of the North Island; the dripping forests and raging torrents of the West Coast of the South Island: all these have immediate significance for the seeing eye and convey in themselves the answers to the questions they raise.

In parenthesis let it be said that intellectual interest and understanding are not presented as a full and satisfying substitute for an innate or cultivated emotional appreciation of beauty. The artist who labours at the analysis of his subject in terms of form and colour does not thereby destroy or dull the sensitiveness of his perception of the beautiful; nor does the musician, submitting to the disciplined restraints of composition, lose or lessen the emotional appeal of good music. All that is argued here is that an understanding of the landscape is an additional source of interest. Not everyone can reach the artistic heights of a Vaughan Cornish, but none needs to sacrifice such artistic appreciation as he may possess on the altar of geographic training.

Geography the Basis of Understanding

The landscape is the concrete reality, shaped in part by the blind forces of nature, in part by the more or less purposeful acts of man. To most of us first-hand, intimate touch with the landscape and its human complement is limited by the extent of our own country, sometimes of a very small part of that country; but, narrow though it may be, this first-hand experience is the foundation on which must be built our concepts of other lands and other peoples. The task is supremely difficult. Even in the best circumstances, when ample literature is supplemented by good pictures and maps, interpretation is apt to be a caricature of reality unless it is informed by an intimate knowledge of some actual, preferably similar, landscape and of the forces at work upon it. In the many areas for which literature is scanty and partial, photographs few and reliable maps non-existent, the difficulty is intensified. Yet the attempt must be made. In these days when a devastating war has been succeeded by international tension and domestic anxiety, when the peace of the world would seem to depend on the realisation of a common attitude to common problems, it is surely vital that public understanding everywhere of the bases, physical and human, of national life and power should be as wide and as well-informed as possible. Professor E. G. R. Taylor's submission in her presidential address to Section E of the British Association for the Advancement of Science in 1947, that the precise assessment of the geographies of the United States and the Union of Socialist Soviet Republics is as important as the precise understanding of their ideologies is timely and convincing; but it is no less important that these precise assessments should become as far as possible part of the working mental equipment of our general public. Too much is at stake in the background differences between the Soviet Union and the western democracies, particularly in the presence of such 'detonators' as Palestine and Korea, for any responsible person to be indifferent to the general ignorance of the relative advantages and deficiencies of the great nations of our day.

THE FUNCTION OF THE MAP

It has here been argued that real geographic knowledge and appreciation must be based on first-hand fieldwork, and that for any single individual the areal scope for fieldwork is limited. It is this limitation that sharpens the need for maps, particularly topographic and geological maps on a wide range of scales. Such maps are pre-eminently the tools of the geographer. They are the shorthand expression of the form and nature of the area represented, giving the student a bird's eye view of the country he knows and providing the best possible substitute for first-hand experience of areas he cannot himself reach. They provide, too, the means of recording his own observations and are an aid to the formulation of ideas and the making of inductions. In short they are the essential key to that thinking in terms of area which is the particular concern of the geographer. The geographer is of course not alone in being interested in maps as a user, nor is he as geographer a maker of standard, general-purpose maps. What is true is that the geographer, almost alone, elevates the map to a key position in all his work. Yet for his supply of standard topographic and geological maps he is normally dependent on some department or departments of central government, the executive instrument of the community at large.

Striking indeed are the differences in the effectiveness of different governments in fulfilling this function. Very little of the land area of the world is mapped at a scale of six inches to the mile or better (Great Britain is unique in being wholly covered at such scales) and for great areas only reconnaissance maps of small scale and doubtful accuracy are available. New Zealand was one of the inadequately mapped countries until pressure of the recent war hastened the production of the one-inch topographic series, which now covers practically the whole of the settled area of the country. This marked a great advance, and reflects credit on the Department of Lands and Survey, but similar series of geological and of soil maps are still a lamentable gap. Distribution, too, has not kept pace with production. It seems that in New Zealand the only way of procuring published official maps is to write for them to the head office of the department in Wellington—a very effective method of preventing sales and limiting dissemination of the maps alike to the educational institutions and to the general public of the country. An enlightened policy of sales through ordinary commercial channels, combined with adequate display, would surely permit a lowering of the present excessive prices along with the reduction of costs, while ministering to a widening and deepening of the interest of the private citizen in his own country.

The geographer as teacher performs the service of inculcating into many or few members of the community some appreciation of land and life, and the understanding so developed is the essential basis for an intelligent and informed interest both in the home affairs and in the international relations that so closely concern daily lives in this age of instability and violence. The geographer as geographer, however, has other, perhaps more direct, contributions to make to the service of the community.

Geography as a Discipline

The case for geography, however, does not rest solely on its usefulness in the realm of practical affairs. The spirit that prompts the question

'What good is it?' meaning 'What is the material reward it is likely to produce?' is all too much with us today. One must confess to a certain sympathy with the Cambridge mathematics don, who, after a long and concentrated struggle with an abstruse problem, regarded his solution with satisfaction and remarked with gusto, 'Thank Heaven no one will ever be able to make the slightest use of that!' Geography has value and can have value in the community only through the enrichment it produces in the mental experience of the individual, and this enrichment reflects developed systems of mental processes, matured under rigid training and productive of valid thinking on the appropriate range of phenomena. Geography is indeed a discipline, and as a worthy discipline it brings its own reward.

THE PART OF THE GEOGRAPHER PREWAR

But the value of the geographer's abilities was very inadequately realised in the years before 1939. Indeed for the geography graduates of British universities there was little hope of appointment to positions giving scope for their expert competence except in teaching. This was perhaps hardly so much to be regretted as might at first sight appear, since for many years the whole output of geography graduates could be absorbed by the schools and still leave the demand unsatisfied. The Civil Service Commissioners made tacit admission of the value of a systematic training in geography as a preparation for administration by giving the subject high marks in the Civil Service examinations, and an increasing trickle of graduates entered the administrative grade of the Civil Service. For certain technical appointments, too, in the Hydrographic Department of the Admiralty and in the Meteorological Office of the Air Ministry a university degree in geography was an accepted qualification for entry, though specialised professional training was necessary after admission. In neither case were these trained geographers being used as geographers, and for neither kind of appointment was the training in geography a necessary preliminary.

One striking development there was, outside the sphere of official action. This was the Land Utilisation Survey of Great Britain, which from small beginnings in the field work of some university students was built by Dr. L. Dudley Stamp into a cooperative effort of universities and schools working to a common plan over the whole of the country. Land use was recorded in the field on the Ordnance Survey six-inch map, and completed sheets were sent to headquarters in London, where a small team of geographers reduced them to the one-inch scale and prepared them for printing in colour. The result is a permanent record in map form for the whole of Great Britain of the use of the land in the last few years before the second world war, a record that is supplemented by a series of county reports under the series title, *The Land of Britain*. The Land Utilisation Survey has been compared to the Domesday Survey, that irreplaceable source of information about the land of England in the eleventh century, but the differences between the two are no less significant than the basic resemblance. Domesday covered only that part of England where ran the royal writ of William I, and was essentially a taxgatherer's survey, or a census of production, compiled from oral testimony and entered as a series of ledger items. It was concerned, that is to say, more directly with the crops, livestock and workers than with the land itself, and the task of giving it precise areal definition in map form, now being undertaken for the first time, is one of exceptional difficulty. This precise areal definition was the problem that the Land Utilisation Survey map solved so effectively, and if the essential basis of intelligent planning is accurate knowledge of what already exists, this map must have its place as part of the foundation on which regional planning in Britain will rest.

The Impact of War

The outbreak of the war in 1939 did not immediately affect this position. The Royal Society had included university geographers in the list it compiled of British scientific workers and their individual qualifications and interests, but so far as geographers were concerned that list remained a dead letter. So in the early days of the war, as in the prewar years, young and keen geographers turned to survey, particularly the survey service of the Royal Engineers, and to meteorology, especially the meteorological services of the R.N.V.R. and the R.A.F.V.R., as the best available channels of service for their acquired skills, and in these services did noteworthy work in survey with field units, in map compilation, design and production, and in weather forecasting for the special needs of sailor and airman.

Only slowly did the fighting services and the ministries more immediately concerned with the conduct of the war begin to appreciate the appropriateness of the trained geographer to intelligence work of various kinds. Here the lead lay with the R.A.F., but the R.A.F. example was quickly followed by the other services. Organisations that call for particular mention in this context include, firstly, a joint enterprise of all three services that produced among other things the 'going' maps that so successfully interpreted the nature of the enemy-held ground in relation to the needs of the numerous kinds of vehicles used by invading armies, and, later, a series of model 'terrain reports' covering much of the operational area of the British and American armies in northern France and western Germany; secondly, the civilian team that compiled a most valuable series of *Geographical Handbooks* for Admiralty purposes; and, thirdly, the R.A.F. intelligence organisation concerned with the interpretation of air photographs.

The Value of Air Photographs

Photo interpretation was not at first essentially geographic either in purpose or in method, nor were the personnel recruited solely from the ranks of geographers, but as the possibilities of the medium began to be appreciated, and the purposes correspondingly widened, the scope for real geographic work was progressively enlarged. In return great strides were made in developing the technique of air photo interpretation as a tool for geographic research. O. G. S. Crawford in his archæological work for the Ordnance Survey had already shown before the war that the air photo can even uncover features of the landscape that remain hidden from the field worker tied to the surface of the ground, but the obvious difficulty of procuring air photos had prevented the peace-time geographer from achieving any significant advance in the systematic application of this new and powerful weapon. Unfortunately the difficulty has by no means ended. A wealth of continuous air photo coverage of Britain, Europe and other key areas now exists in the Air Ministry, but it remains jealously guarded in official custody, to be doled out with niggardly hand at prices prohibiting the establishment of adequate air photo libraries in university departments of geography. For New Zealand air cover on uniform scale is not complete, but a considerable amount of official material, accumulated in the course of the regular work of the R.N.Z.A.F. remains, here as in Britain, accessible only with difficulty to the researcher outside the official circle. Such a policy is short-sighted in the highest degree. If the community is to get full value from the new techniques, its official organs must realise in a more sympathetic way their responsibilities and opportunities.

The postwar Britain is building inevitably on the prewar, but more immediately and particularly on the war experience of the community, and from the present point of view the outstanding characteristic of the war was the abrupt and unprecedented extension of government control over almost every aspect of the life of the community. Rationing of food and raw materials, conscription for the armed forces, direction of the labour of the civilian population, selection of imports and discrimination between one productive enterprise and another brought most of the normal activities of the population under the sway of the 'Thou shalt!' and 'Thou shalt not!' of a government become omnipotent and endeavouring to become omnicompetent. True, the inter-war period had already seen some governmental encroachment on the traditional English liberty of the subject, and Planning (with a capital P) was already something of a nostrum before 1939, but the scale and the intensity of the official direction of the daily life of the man in the street during the six long years after 1939 was something entirely new.

The Geographer and Planning

Six years, however, was a long enough period to get people more or less habituated to the grooves within which they were compelled to move, and the postwar period opened with the victory at the polls of the Labour Party, the party explicitly committed to the policy of expanding the active participation of the government in the peace-time business of life and of planning on a national scale. There is one aspect particularly of such governmental participation that is very relevant to the present topic, namely the work of the Ministry of Town and Country Planning. This rather clumsily named ministry predated the present Labour Government—which has, however, given it wider scope and fuller powers—but may be regarded as an instrument for materialising part of the longer term ideals of the government. Where nationalisation of the Bank of England, the coal industry or the railways was a measure of reorganisation of functional activities, the existence of a ministry for regional planning postulates a view of the country in area and the existence of geographic differences between regions and between districts within the same region. It assumes, too, that area, like functional activity, can be rationally planned so as to secure the maximum use of the resources of the country at the minimum social cost. In passing it may be noted that, irrespective of the soundness of the assumption or of the wisdom of the administrative action flowing from it, the view itself is geographical, the information on which action is taken must be largely geographical, and the consequences of the action taken will be writ large in the rural and the urban landscape of the country. The essential research, indeed, cannot be confined to the field of geography, and such specialist workers as geologists, statisticians and economists are employed both in the London headquarters and in the regional offices of the ministry, but much of the primary research and of the coordination of the results of the other specialised enquiries, with the object of making available to the administrators in text, map and diagram the real nature and the critical features of the area concerned, is precisely the kind of work that the geographer, and no one else, has been trained to do.

The Recognition of Geography

It is encouraging, therefore, to find that geographers have their full share of research posts in the ministry, and that the administrators, who have to make the fateful decisions, will have access to competent geographic appreciations. That, however, by no means gives unqualified approval of the operation of a ministry armed with wide powers and directed to the nation-wide control of the landscape of Britain. If 'regional' implies area, 'planning' no less implies time, and time in this case of the order of two generations or more—enough, surely, to strain the foresight of even the ablest planners. Further, planning on a national scale carries with it the implication of undesirable rigidity, while a mistaken decision, relatively innocuous on a personal or local scale, may produce consequences amounting to national disaster. Nevertheless the official recognition that regional differences exist, that these differences can be analysed, that their implications for society at any given moment can be evaluated and that such analysis and evaluation demands the special expert knowledge of the geographer is a great step forward, conceding both the reality of the discipline and the social value of the product.

In this address an effort has been made to indicate and illustrate some aspects of the value of geography to the community. It closes on a rather different note. The conferring of benefits is apt to be short-lived and unprofitable if it is always in the same direction, and the community can enjoy the full fruits of advances in pure and applied geography only if it provides a sympathetic *milieu* in which the professional geographer may work. It is the promotion of such a *milieu* that is the special opportunity of such a society as this, rooted as it is among the general body of citizens, but in direct contact with the ferment of ideas working in the university departments of geography. The members of the New Zealand Geographical Society are at once a sign and a condition of the progress of the subject in this country. The society has done much in the few short years of its existence: it will, without doubt, do greater things yet.

THE OUTLYING ISLANDS OF NEW ZEALAND

R. A. FALLA

ALTHOUGH the three main islands of New Zealand lie between the parallels of latitude thirty-four and forty-seven degrees south, and thus present a range of climatic and related conditions extending from subtropic to subantarctic, this range is considerably extended at both extremes when the so-called outlying islands are considered. The term outlying islands is used to exclude the numerous islands and islets within fifty miles of the main islands and embraces therefore:—

Kermadecs	29° 15′ S.	178° 00′ W.
Chathams	44° 30′ S.	176° 30′ W.
Bounty	47° 41′ S.	179° 03′ E.
Snares	48° 00′ S.	166° 35′ E.
Antipodes	49° 41′ S.	178° 43′ E.
Auckland	50° 50′ S.	166° 00′ E.
Campbell	52° 33′ S.	169° 08′ E.
Macquarie	54° 40′ S.	158° 50′ E.

With the exception of Macquarie Island and the Kermadec Islands all are on a submerged plateau connecting them geologically with New Zealand and, with the exception of Macquarie Island which is Tasmanian territory, all are under the control of the New Zealand Government. They may be conveniently grouped in three categories: (a) Subtropic—the Kermadec Group; (b) Temperate and comparable except in size with New Zealand proper—the Chatham Group; (c) Subantarctic—all the rest, with the qualification that the Snares, the Auckland Group and Campbell Island might be graded as 'modified subantarctic' because of certain features which appear to be due to the influence of the East Australian Current (Notonectian).

There is considerable literature dealing with the geological, biological and climatic features, as well as the human history, of most of them, and the author has made free use of published data.[1] This help in compiling concise descriptions is all the more appreciated because communication with all the islands except the Chathams has always

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[1] Acknowledgement of the use of unpublished notes, photographs and other help is gratefully made to Messrs. C. A. Fleming, A. Gardiner, G. M. Turner, and the Department of Works.

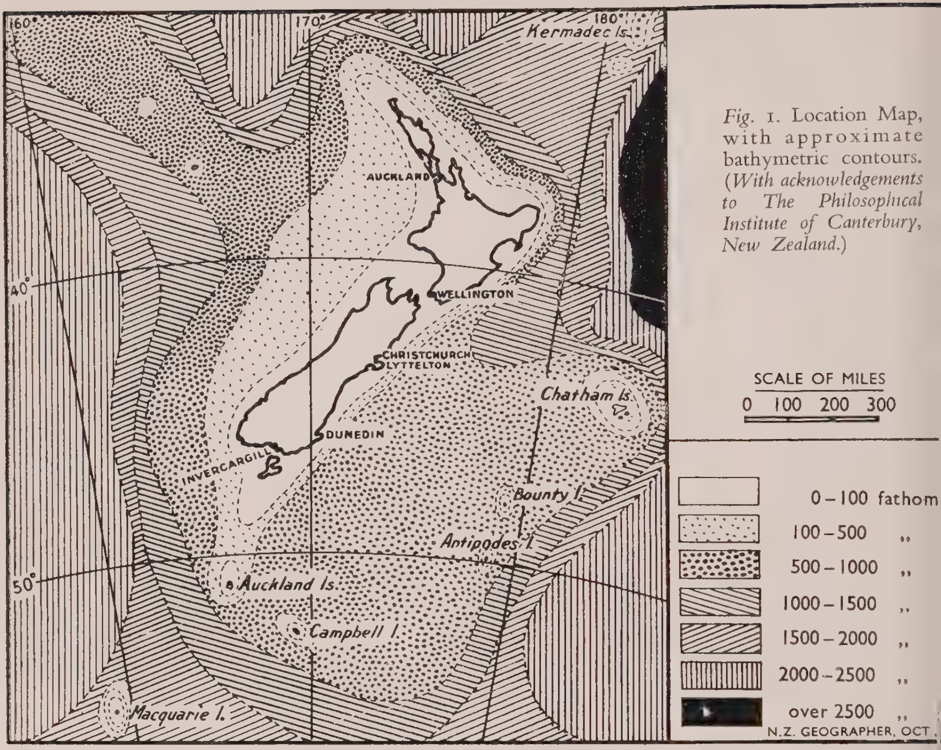

Fig. 1. Location Map, with approximate bathymetric contours. (*With acknowledgements to The Philosophical Institute of Canterbury, New Zealand.*)

been sporadic and infrequent. The goal of landing on them all was capable of easy achievement only in the days of whalers and sealers, and again during the period of rescue and provision service for castaways by government steamers (1887-1927). Speaking generally, the outlying islands receive today less official and popular notice than at any time in the history of settlement in New Zealand. To consider whether this trend is justified by facts and events is the aim of this brief summary of their natural features and history.[2]

THE KERMADEC ISLANDS

This group is one of several habitable subtropic islands occurring across the Pacific in latitude 30° S. Although widely separated from one another, Lord Howe, Norfolk, the Kermadecs, and Juan Fernandez share much that is similar in climate, general facies of vegetation and composition of the fauna. Various kinds of permanent settlement by

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[2] Macquarie Island has not been included here as it is very fully described in the reports of the Australasian Antarctic Expedition of 1911-1914 (under the leadership of Sir Douglas Mawson). The Chatham Islands will be dealt with in a subsequent article.

Europeans have been attempted on all of them, with success insofar as the local factors involved are concerned, but with a degree of failure also, attributable to their restricted size and isolation.

The physical features of the Kermadec Islands and their early history have been fully described in scientific journals in New Zealand; reference can be made to them for detail as a brief summary only can be attempted here. Of the four main islands shown in the accompanying map the highest (1760 ft.) and the largest (7260 acres) is Sunday Island or Raoul. Like the rest, it is of volcanic origin, a large part of its area being a crater. The surface is composed mainly of pumiceous and other tuffs, with a few lava flows. There is some evidence of recent elevation and fragments of hornblende-granite found have been regarded by Speight[3] as an indication of continental origin. Sunday Island presents a mountainous surface with alternating ravines and spurs which end in sheer cliffs round most of the coast except in Denham Bay where there is a gravel beach, and some stretches of sand and shingle along the north coast. Elsewhere there are debris and boulder beaches at the foot of cliffs. The island is not particularly well-watered, streams being few; but there are two lakes in the crater, a smaller one in the forest near the head of a valley, and a swamp behind the beach at Denham Bay, near which settlers are said to have obtained good water by sinking wells.

The seven small islets lying close to Sunday Island on the northwest, and known collectively as the Herald Islets, also are volcanic, as are the more distant Curtis, Macaulay, and l'Espérance or French Rock. Thermal activity continues in the form of a few fumaroles on Sunday Island and more lively manifestations in the form of boiling mud, sulphur, and siliceous sinter on Curtis Island. There have been at least two eruptions in the group within the last century, and earthquakes are frequent and often severe.

The island lies south of the trade wind belt, and the prevailing wind cycle, like that of northern New Zealand, is mainly west to southwest in winter, east to northeast in summer. Hurricanes are infrequent and were recorded by the Bell family only nine times in thirty years. Weather data were systematically recorded by an expedition in 1908 for nearly a year, the range being from 47° F. (August) to

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[3] R. Speight: 'Petrological notes on rocks from the Kermadec Islands; with some geological evidence for the existence of a subtropic Pacific continent.' *Trans. N.Z. Inst.*, Vol. 42, 1910, pp. 241-254.

86° F. (February). They noted also an even distribution of rainfall, and high humidity. Evidently, droughts are rare, frosts unknown. Data kept more accurately during the past seven or eight years of continuous occupation by observers confirm the general picture given above. Full climatological analyses and summaries are, of course, now available but are as yet unpublished.

Sunday Island is predominantly forest clad, a condition to which its soil and climate are both conducive. In appearance and composition this forest has impressed all observers, including those without botanical training, as being very like that of parts of northern New Zealand. The pohutukawa, of which it is largely composed, is closely related to that of the mainland; and the only indigenous palm, very abundant, is a nikau. Several other distinctively New Zealand shrubs are common, along with tree ferns. Cheeseman and Oliver,[4] in very detailed botanical studies, have drawn attention to the existence also of a strong Polynesian element in the flora, while admitting a preponderance of New Zealand forms. They are in agreement in considering that the islands received all their plants by transoceanic dispersal.

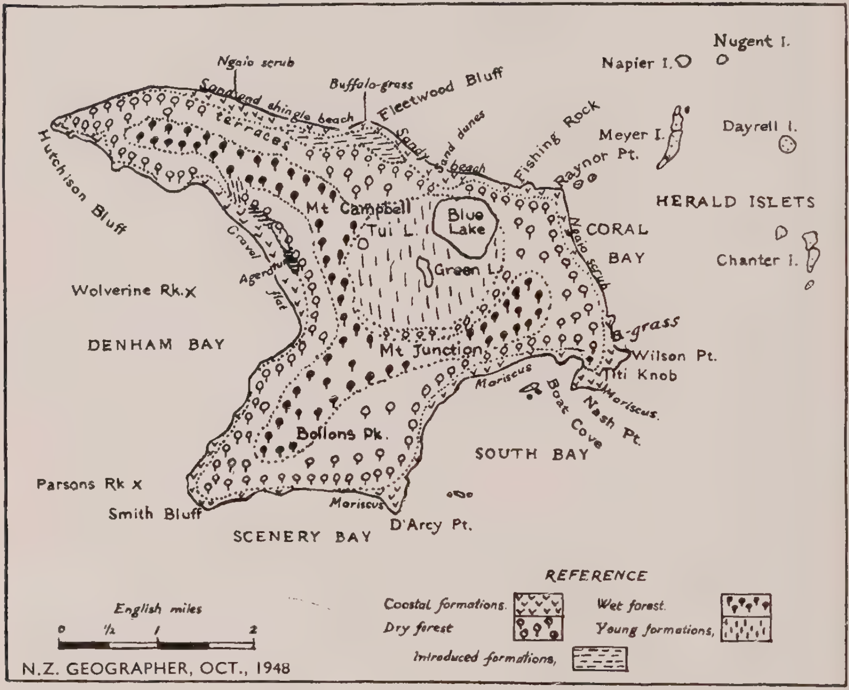

Fig. 2. Botanical sketch map of Raoul, or Sunday Island. (*From Oliver*, 1910.)

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[4] W. R. B. Oliver: 'The Vegetation of the Kermadec Islands'. *Trans. N.Z. Inst.*, Vol. 42, 1910, pp. 118-175 (with bibliography).

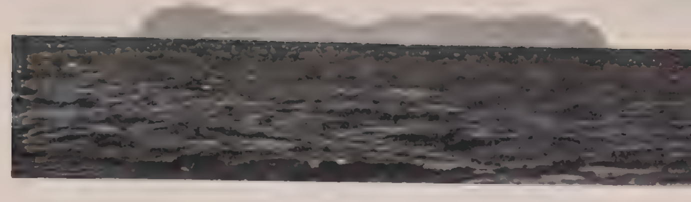
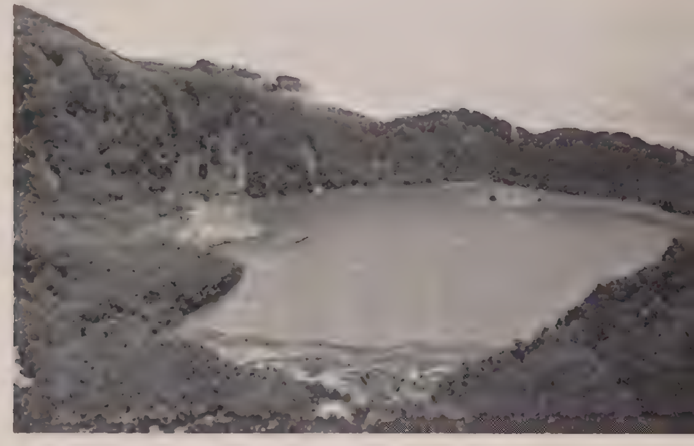


Fig. 3. Raoul or Sunday Island,
bearing north.
Photo: A. Gardiner



ig. 4. Raoul Island. Blue Lake
rom Moumoukai trig.
Photo: A. Gardiner

ig. 5. Raoul Island. Vegetation
long a road cutting.
Photo: A. Gardiner

ig. 6. Raoul Island. Communi-
tion and construction works
1944.
Photo: A. Gardiner

In addition to forest there are coastal plant formations, which occupy most of the area of the smaller islets. An important factor also in present day conditions is the effect of plant introductions by man, some of which, like cape gooseberry, have spread on cleared land. There is a long list of introduced tropical fruits, cereal and root crops, and pasture grasses, many of which have flourished when tended, but seldom become established as self-supporting and increasing elements.

The indigenous fauna is neither rich nor remarkable. It has the characteristics of a recent invasion in that there are neither mammals nor reptiles; and the land birds are hardly separable from the New Zealand forms to which they are related. Invertebrate animals recorded do not alter the picture. There is a considerable seabird population: but in this case the forms are those of tropic and subtropic seas, none of them occurring in New Zealand.

Of introduced mammals the first probably was the Polynesian rat, which is now largely replaced by the Norway rat, but the most important in its influence is the goat. On Sunday and Macaulay Islands, as Oliver points out, these animals have effected a profound change in the natural vegetation. On Macaulay Island it amounts to complete destruction of original forest; on Sunday Island to considerable modification and impoverishment.

The group must have been known to Polynesian voyagers, whose stone tools have been found on the largest island; but their discovery by Europeans did not commence till 1780, when Lieut. Watts, R.N., in the *Lady Penrhyn* found Macaulay and Curtis. Five years later they were seen again by d'Entrecasteaux who sailed on to discover the large island and name the whole group, Kermadec, after the captain of his consort *l'Espérance*. Other visits are recorded; but the sealing and right whaling traffic of the next thirty years had no occasion to work in that direction. With the rise of sperm whaling they soon became known as a regular 'ground', and it was the opportunity for trading produce to whalers that opened up an era of sporadic settlement, commencing with Baker and Reid in 1837. Here they raised families and grew successfully potatoes, maize, yams, kumeras, taro and bananas. Their introduction of animals included the goats in 1840. There was continuous occupation by these settlers and subsequent arrivals until 1872, when a volcanic disturbance caused the then occupant and his wife to leave.

The era of the Bell family, the most remarkable in the history of

Sunday Island, commenced in 1878. Thomas Bell, while resident in Samoa, had been attracted by the possibilities of the Kermadecs and settled there with his wife and five young children. Planning to cultivate fruit and crops and to raise farm animals on a large scale he employed sixteen natives of Niue, but, owing to the rapid dwindling of customers with the decline of whaling, he eventually had to send them back. However, there was spacious and healthy living for the Bell family itself. They did not cease to experiment and had much agricultural success.

British sovereignty was formally proclaimed in 1886; and in the following year a proclamation of annexation by New Zealand was read by the captain of the government steamer. As a sequel, the island was subdivided, Bell allotted a freehold, and leases advertised for the rest. Few of them were taken up; but a number of new settlers then began to arrive. They formed a loosely-knit community with no organisation and little cooperation. After varying periods most of them left, but the Bells remained. Their children, who had gained education by private tuition, gradually moved elsewhere; but the old people remained until they left on instructions at the outbreak of war in 1914.

During that war the islands gained notice first from being used as shelter by the German raider *Wolf* in successful descents on allied shipping, and later as the rendezvous where the escaping raider captain, Count von Luckner, in the scow *Moa*, was intercepted by New Zealand forces.

The interwar period saw a renewal of interest in private settlement projects, most of them planned in the spirit of adventure that is such an inadequate substitute for skill, industry and organisation. A venture by three men in 1926 was not successful; the plans of a syndicate in 1929 fell through, although two men finally landed and settled in 1935. There were further arrivals, all men, in 1936 and 1937. Some account of their experiences and impressions has been published by A. M. Venables[5] who, in a booklet not remarkable for its objectivity, expresses the opinion that the climate or some other feature of the life induces in men a lethargy from which, on historical grounds, he absolves women. Be this as it may—and it is a condition of insular life not peculiar to the Kermadecs—the settlement fulfilled few hopes and achieved nothing lasting. More tangibly, the main handicaps to such ventures appear to be undependable communications by small unregistered yachts and lack of any organisation to ensure either regular transport or access to markets at the right time.

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[5] A. M. Venables: *The Kermadec Group*, Auckland, 1937.

Government interest in the Kermadecs was revived in 1937 in the course of a survey of South Pacific islands for future airfields. Engineers, surveyors and radio technicians obtained in their respective fields data which shortly were to be required for emergency use with the outbreak of war. The Aerodromes Branch of the Public Works Department then took over the establishment and maintenance of a radio station and a military coast-watching unit. By the end of the war, when military personnel were withdrawn, permanent construction of roads, buildings and landing facilities had been begun. Some attempt was made to check and control animal pests, and Cook Island natives were settled, under supervision, to extend the cultivation of oranges. This work continues and regular, though still infrequent, communication with New Zealand is maintained by government vessels.

The problem of the Kermadec Islands is the problem of all habitable and productive islands situated at a great distance from markets; it is the problem of reliable and rapid transport at times of optimum supply and greatest demand for their produce.

The Snares

This is a small group of which the main island is situated approximately in latitude 48° S., longitude 166° 35′ E., or about sixty-five miles S.S.W. of Southwest Cape, Stewart Island. In most respects the Snares may be regarded as distant outliers of Stewart Island; but their flora and fauna show sufficient link with islands further south to explain why they often are described along with the subantarctic group.

The main island is roughly triangular, about two miles on each leg, and about 500 feet high. From a distance it presents a fairly level surface; but this is only in outline as it is flanked by steep cliffs on the west and south and has a gentle fall to a much lower eastern coastline, with rounded spurs separated by the valleys of at least two streams of fair size. Where they reach the sea a rift in the rocks forms a deep and sheltered boat harbour which, however, is not safely negotiable for craft much over sixty feet in length. There are detached rocks and stacks at all three corners, especially the southeast, where a high islet is separated from the larger mass by a narrow channel. West by south, and about eight miles distant, is the so-called Western Reef, a chain of five islets some 200-300 feet in height and barely separated from each other. A rock just awash midway from the main island to the Reef, and a pinnacle or two and shoal water for another mile to the southwest beyond it, indicate the former existence of a more extensive chain.

Until recently the only rock recorded from the Snares has been 'a moderately coarse muscovite granite'[6] which, although not identical with that found elsewhere, is regarded as near enough to indicate the Snares as part of 'the same plutonic complex of which Stewart Island and the southwest of Otago are composed.' The level outline already mentioned is regarded as marking a plain of marine erosion and consequently presumed past elevations. There is all the evidence of rapid cliff erosion on the west which characterises islands in these latitudes. The highest point of the island, 620 feet, is on the western peninsula which now is connected only by a very narrow razorback ridge. Except on cliffs and headlands the island is covered by a layer of vegetable mould and dark peat of depth varying from a few feet to twenty or more.

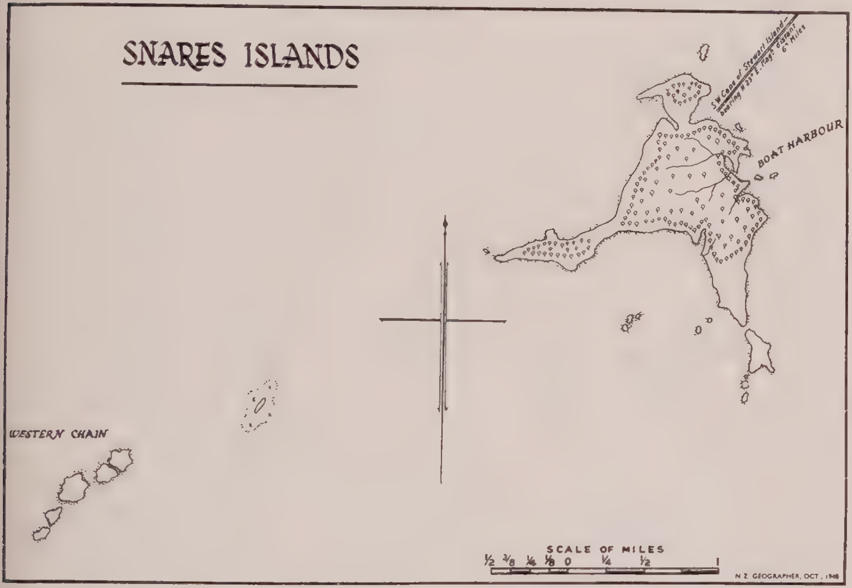
SNARES ISLANDS
SW Cape of Stewart Island—
Bearing N 23° E. Magt distant
67 Miles
BOAT HARBOUR
WESTERN CHAIN
SCALE OF MILES
½ ⅜ ¼ ⅛ 0 ¼ ½ 1
N Z GEOGRAPHER, OCT., 1948

Fig. 7. The Snares Islands are about sixty-five miles S.SW. of Stewart Island, the most southerly of New Zealand's three main islands.

There are no records available from which to draw up any precise description of the climate. The cloud and mist that often obscure the higher islands further south have not been reported often at the Snares which are visible even in poor weather at fifteen miles and quite clearly in fine weather at thirty. Prevailing winds are from north of west, with the less frequent southwesterly and its accompanying heavier sea. Unbroken spells of rainless weather have been reported by two visiting parties, three weeks of it being experienced by the lighthouse survey party in the summer of 1889-1890, and a similar spell being inferred from dry conditions observed by a scientific party ashore for a few hours on 15 November 1907. On the other hand an expedition ashore from 29 November till 6 December 1947 experienced abnormal easterly weather with heavy rain on all but four days. Indications are, however, that the Snares group has a lower rainfall than have islands to the south and than Stewart Island and southwest Otago. Temperature changes sometimes are steep (as much as 20° F. with a change of wind) but probably the average is mild as the islands apparently are within the influence of the East Australian (Notonectian) Current.

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[6] P. Marshall: 'The Geology of Campbell Island and the Snares.' *The Subantarctic Islands of New Zealand,* Vol. 2, 1909, p. 704, (edited by C. Chilton).

The main covering of the main island, of which the peat surface already has been mentioned, is a low forest of tupari (*Olearia lyallii*) partially replaced near the coast with *Senecio stewartiae*. The only other shrub at all abundant is *Hebe elliptica*; while tussock areas composed of two species of *Poa* also occur here and there and extend across the island on the saddle leading to the northern block. There is no undergrowth in the forest other than the coarse ferns *Blechnum* and *Polystichum* in gullies. The total of indigenous plants is small, the recorded list being still under thirty. The Western Reef is practically devoid of vegetation.

In the days following the discovery of the islands, Snares and seals were as names almost synonymous. There are few islands in the zone inhabited by the southern fur seal that offer for their size better conditions of the kind required by breeding seals—boulder beaches at the foot of talus slopes, or accessible ledges adjacent to deep water. Both are available round the coasts of the main island, and the latter particularly on the Western Reef. As the southern fur seal cannot easily be farmed to recovery like the seals of the Alaskan Islands, the present stock is a negligible fraction of former abundance. There is nevertheless a healthy breeding stock at the Snares of not less than 3000. In addition to fur seals there are a few score of sea lions (*Otaria hookeri*), almost all young bulls, and probably overflow from the Auckland Islands. As a few cows have been seen hauling out in November it is probable that

Fig. 8. Snares Islands, bearing south by west. *Photo*: *A. J. Black*

they also breed there. Sea elephants, which prefer flat beaches when ashore, find little space at the Snares, but what they do find at the mouth of the two streams in the boat harbour, where there is room for only four or five, they appear to occupy.

Birds are the most conspicuous feature of the animal life of this group of islands, and the concentration of oceanic birds in the breeding season is quite remarkable. The sooty shearwater or New Zealand mutton bird, which is a seasonal migrant present from October till April, has numerical supremacy at that time. Estimates of the breeding population have varied from 50,000,000 (at one burrow per square yard which is the apparent concentration in some places) to a cautious 'not less than 1,000,000'. In the absence of a very careful survey it is not possible to estimate accurately, but taking into account a number of known factors it would be not an unreasonable guess to place the figure at five million birds. Three or four other petrels common to the Stewart Island area also burrow in smaller numbers. Surface breeders of the same great family are represented by the dainty Buller's mollymawk on the main island, and another mollymawk and the Cape

Fig. 9. Snares Islands: east coast showing boat harbour and vegetation.

pigeon on the Western Reef. The Snares are also a penguin stronghold with a population of endemic crested penguins large enough to make a visible impression on the landscape with their nesting colonies on slopes and valleys reached either by direct climb from the sea or by way of the stream courses. There are other coastal sea birds and native land birds of a few kinds, strongly endemic and very abundant. There are also a few stray birds self-introduced from New Zealand. The rest of the fauna, like the vegetation, is not rich in variety.

If more space has been allowed here for birds than in the accounts of other islands it is because the bird life of the Snares is in many respects unique: not one of the least of these respects is that destructive introduced mammals have so far miraculously failed to become established and the group has thus been spared the fate of so many otherwise potential sanctuaries.

The Snares were independently discovered on the same day, 23 November 1791, by Vancouver in *Discovery* and Broughton in *Chatham*. Within a year they became known to sealers, but accounts of visits are vague, as all sealers were averse to publicising localities or catches. Either because of more productive new grounds or depletion of the Snares, visits soon became less frequent, and when a vessel marooned four men there in 1810 the three who survived were not picked up (with only 1300 skins) till 1817. They had lived on seals and birds and are said to have grown potatoes. Sporadic sealing continued for a century and in 1867 the islands were included in a chain of provision depots for castaways, which were maintained till 1929. The maintenance of these provided opportunity for many brief visits by naturalists. In 1889-1890 the main island was surveyed for a lighthouse site, but the light was never installed. By this time fur seals were legally protected, but during an open season in 1915 sealing was revived, and again in 1924 along with a mutton birding venture. Since then the group has reverted to isolation, although visited by a government vessel in 1944 and 1945 and by parties of scientists in 1947 and early 1948.

The commercial possibilities of exploitation of seals and mutton birds or of the so-called guano, which is really peat permeated with the organic waste of bird colonies, seem to be outweighed by the opportunity of protecting and preserving intact one of the world's most interesting sanctuaries. Experience shows that the utmost caution fails to prevent the accidental or careless introduction of rats and cats when parties are being regularly transported in pursuit of an industry.

THE AUCKLAND ISLANDS

In many respects these are the most important of the subantarctic group. Their capacious and sheltered harbours have made possible several projects of development and even settlement, and though at present uninhabited they have had a chequered human history. Numerous published reports are available and unpublished reports prepared during wartime occupation have been used in the following summary.[7]

The group lies between 50° 26′ and 50° 56′ S., and between 165° 52′ and 166° 22′ E., Northeast Cape being 190 miles S.S.W. of the South Cape of Stewart Island. They 'cover a total area of 465 square miles, the actual land area being 220 square miles. The group consists of one large and five smaller islands, together with a number of islets and detached rocks. The large island, which will be referred to in this report as the mainland, is twenty-four and a half miles long, and from three to sixteen miles wide, while its area is 179 square miles (114,600 acres). To the south of the mainland and separated from it by Carnley Harbour (sometimes known as Adams Strait), is Adams Island. This is also a large island, having a length of thirteen miles and a maximum breadth of five and a half miles, its area being thirty-five and a half square miles (22,600 acres). A number of islands lie off the north-eastern portion of the mainland, the most important being Enderby Island, which covers 1,770 acres. The only other island of importance is Disappointment Island, containing 970 acres, and lying off the western coast. The total length of the group is thirty-four miles, while the overall breadth amounts to twenty-two miles'.[8]

The islands are composed in the main of lava and scoria originating from two main crater areas, one in the region of the present Carnley Harbour, and another, of which Disappointment Island appears to be a remnant, to the northwest. High cliffs on the south and west and to a lesser extent even in the north bear witness to the rapid erosion of such a land mass. This erosion already has eaten back to the high main ridge of the main island from which the decline to the east coast is more gradual. The eastward-trending valleys, which show evidence of glaciation in cirques and small moraines, all reach the sea as inlets, some of them narrow and fiord-like. In the south a breakthrough of the western wall has converted Carnley Harbour into a strait; while in the north the valley behind Laurie Harbour already has been partially decapitated. The greatest elevation occurs in the south where mountains on both sides of Carnley Harbour are just over 2000 feet. In the north Mt. Eden, 1380 feet, is sufficiently higher than surrounding hills to be a conspicuous landmark. There is no low coastline or sandy beach except on Enderby Island and at the head of some east coast inlets. Cliffs elsewhere are for the most part steep with a few masses of coastal talus and large boulders. Sea caves, undercut below supporting ceilings of more solid lava, are numerous.

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[7] Acknowledgement is made in particular to the full unpublished manuscript report to the Lands and Survey Department accompanying the survey of A. W. Eden in 1944-1945.

[8] A. W. Eden: *ibid.*

Although air temperatures are comparatively mild and equable (a range between 35° and 65° F. with an average difference of only about 10° between summer and winter) the climate gives an unfavourable impression because of high humidity, constant low cloud obscuring the sun, and frequent high winds.

The vegetation is at lower levels luxuriant for an island in such a high latitude. The arborescent and shrubby plants are not rich in variety: rata forest, almost pure in places, is interspersed with *Dracophyllum*, *Suttonia*, and a few others, with *Hebe elliptica* on exposed faces. There is sporadic occurrence of *Fuchsia* and tree ferns, and one or two remarkable areas of the sturdy *Olearia lyallii*. An almost impenetrable patch of the last mentioned now grows on the west headland of Erebus Cove which is known to have been entirely cleared as late as 1870. It is possible that the dense *Olearia* forest which surrounds a central core of rata forest on Ewing Island may also have grown on man-made clearing. Above 300 feet are areas of tussock and of subantarctic meadow composed of a varied flora which has attracted the interest of botanists for more than a century. In exposed parts it flourishes at sea level as at the famous 'Fairchild's Garden' at the west entrance to Carnley Harbour. Climatic conditions and the nature of the vegetation have been favourable for the formation of peat which holds an immense amount of water and makes for spongy surface over much of the group.

There is a restricted land fauna of New Zealand affinities with the endemic peculiarities that seem to be associated with long isolation. A duck (*Nesonetta*) related to the mainland brown duck, is flightless. Other land birds show only subspecific differences; there are no reptiles or amphibians; and of strictly freshwater fishes only one, *Galaxias*. Insects and other invertebrates as well as many animals in the marine littoral are modified New Zealand forms. Much of the marine life, however, including coastal fishes, has a circumpolar relationship.

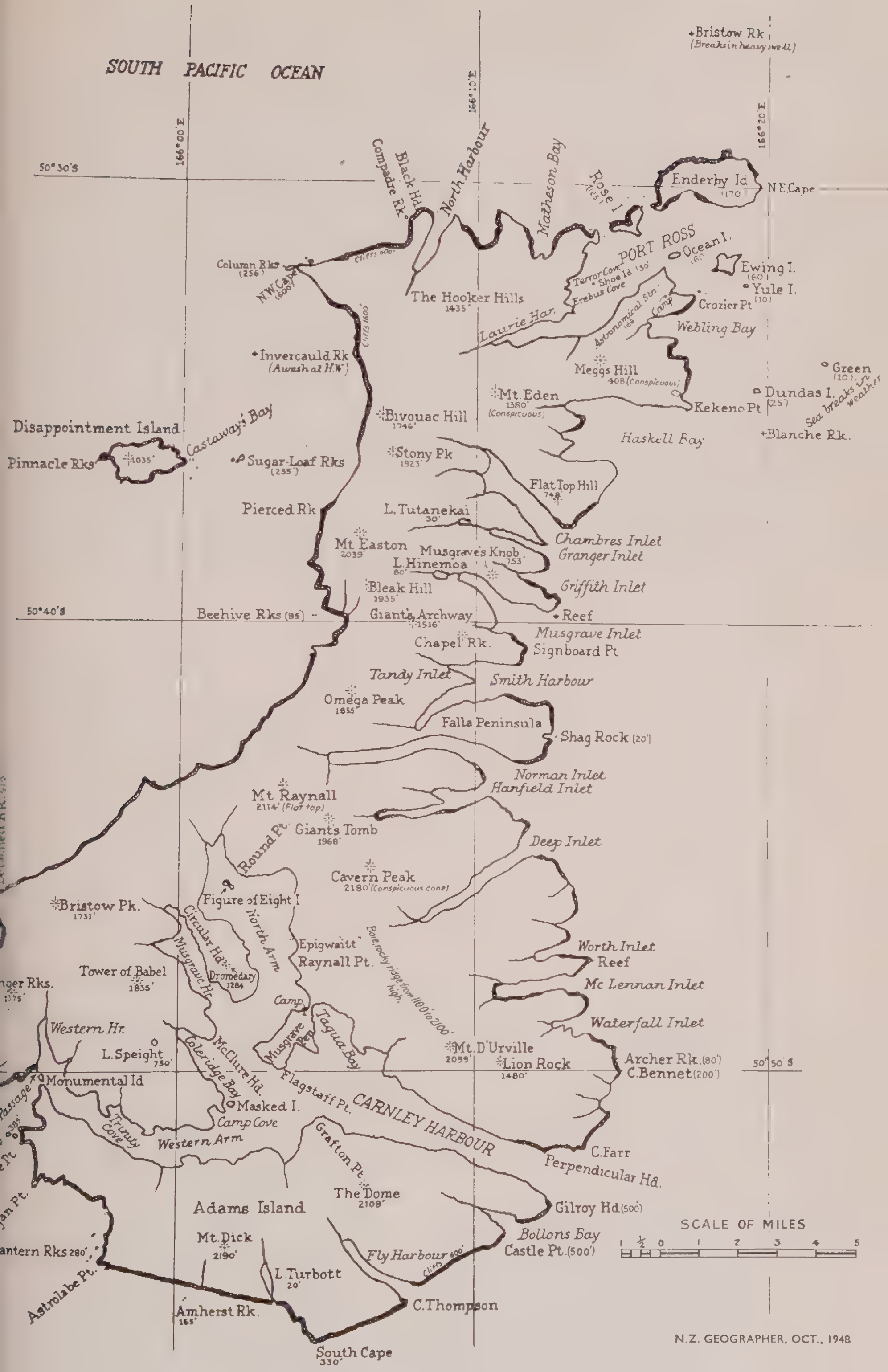

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Fig. 10. The Lord Auckland Group. (*Map drawn by A. W. Eden, 1945.*)

Fig. 11. Port Ross, Auckland Islands: fingerpost points to the provision depot for castaways. *Photo: E. F. Doley*

This is especially true of the numerous oceanic birds such as penguins, petrels and shags, and of marine mammals. The islands are breeding headquarters for the powerful sea lion, *Otaria hookeri*, and have some surviving rookeries of the once abundant fur seal. Sea elephants are regular visitors, as also to a lesser extent are sea leopards.

Usually, the Auckland Islands have been regarded by visitors approaching from the north as typically subantarctic; but practically all voyagers approaching from an antarctic background have regarded them as verdant and mellow. They have a more attractive appearance and a milder climate than has any other subantarctic group, such as, for example, Kerguelen, in the same latitude. When first reported by Abraham Bristow of the whaler *Ocean* in 1806 they were considered worth another visit in the following year. Their safe anchorages made them a popular centre for shelter and refit and their seal herds were a further attraction. The possibility of a permanent settlement associated with all this activity commended itself to Charles Enderby of the firm whose skipper had discovered the island, but nothing was done about it for some years. Meanwhile, scientific expeditions of three nations visited the group and some useful charting was done. Finally, in 1849, the ships of the Southern Whale Fishery Company landed their settlers in Port Ross. They were to service the ships, raise fresh provisions for other vessels, and endeavour to become self-supporting.

A group of Maoris had come from the Chatham Islands some ten years earlier with the same idea, so for a time the harbour shores supported a mixed population of about 300 people; but not for long. By 1852 the settlers, both pakeha and Maori, were asking to be taken off, and the settlement was abandoned. There were not enough whales near at hand to pay, visiting ships were irregular, and there were various sorts of dissension. It is quite likely that the settlers found conditions irksome and monotonous. Ross had remarked in 1840 on the depressing effect of high humidity, a factor which, combined with lack of sunshine, must always render the southern islands unattractive for settlement.

Official interest in the group was never very great in government circles in either Britain or the colonies. There had been a proposal in 1841 to found a penal settlement there, but it was not followed up; and there had been formal recognition of the Enderby venture by the appointment of Charles Enderby as Lieutenant Governor. After that, official oblivion was not again disturbed until a series of shipwrecks had occurred with prolonged privation for the survivors. Belated news of the *Grafton* and *Invercauld* wrecked in 1864 roused much public sympathy in New Zealand; but it was not till after the wreck of the ship *General Grant*, carrying passengers and bullion from Australia in 1866, that the Provincial Council of Southland arranged to establish depots of clothing and provisions that were later maintained and serviced by the central government until 1929. As long as sailing vessels without wireless telegraphy continued to use the great circle route from Australia to Cape Horn wrecks occurred at intervals—1887, 1891, 1905, 1907—and the survivors obtained some benefit from depot

Fig. 12. Auckland Islands. Carnley harbour from the west.

stores until rescued. There have been numerous attempts to find and salvage the gold reputed to have been lost with the *General Grant*. Of their prospects of success it may fairly be said that a study of the records and an examination of the locality would satisfy any but the most incorrigible adventurer that the project was futile.

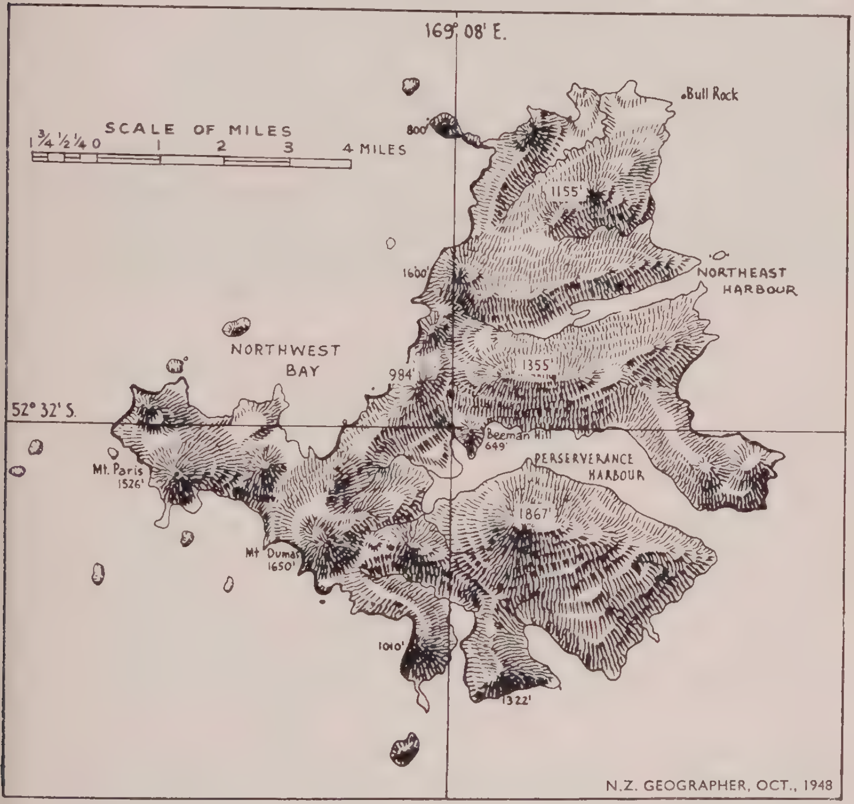
Pastoral expansion in the early 'nineties brought the islands again to notice when they were cut up and leased. Pedigree Shorthorn cattle and Romney sheep were grazed successfully at the Aucklands by the Moffett family of Invercargill, but as communication became more difficult and expensive it was given up. Surviving descendants of the cattle still exist on Enderby Island at the time of writing. Some mention also should be made of the survival of other introduced mammals. Pigs, which were introduced in 1807 and subsequently, are plentiful on the main island where they have effected a marked reduction of certain plants and much bird life. Cats also manage to thrive, along with a healthy population of mice. Goats are restricted to one or two drier areas, and rabbits of two different strains are found on two of the northern islands.

From 1941 till 1945 coast-watching parties under naval direction were maintained by the Department of Works near Port Ross and in Carnley Harbour. The establishments developed into valuable weather stations and their members carried out limited exploration in the fields of natural science. It was from these bases that the topographic survey of 1944-1945 was conducted.

Campbell Island

Lying in a position roughly 150 miles E.S.E. of the Auckland Islands is Campbell Island, 52° 30′ S., 169° 08′ E. Seen in outline from the sea it is generally high with a number of scattered peaks of over 1500 feet. The highest, Mt. Dumas, 1650 feet, and some three others on the south coast, already are eroded back by sea and weather to the vertical plane of the peaks themselves. This high block is almost separated from the more uniformly elevated northern block by Perseverance Harbour piercing the east coast to a distance of five miles. Northeast or Penguin Harbour, though narrow, is also a good anchorage, while the unusually resistant southwest block (*Fig.* 13), almost unique in subantarctic island structure, affords some shelter to Northwest Bay. As Marshall has pointed out, the coasts on the south and west now strike across what must have been the heart of the island.

That much of the island is of volcanic origin is superficially evident in the many terraces formed where horizontal flows of lava are separated by less resistant scoria beds. But while earlier geological investigators, notably Filhol, regarded most of the surface features as volcanic formations, later visitors, in particular, Marshall, have drawn attention to features which suggest subsequent glaciation. Sedimentary rocks in considerable variety are also present, and the mass of gabbro in the southwest is considered to indicate that the island has had a comparatively long and varied history as a land mass. Further geological work in recent years, including correlation of fossils, is at present in course of publication.



N.Z. GEOGRAPHER, OCT., 1948

Fig. 13. Sketch map of Campbell Island. (*By courtesy of the Meteorological Office.*)

However varied the geological history may have been, the plant life and the terrestrial animals are in the main similar to those of apparently newer islands and are in fact less rich in variety and degree of endemism than are those of the Auckland Islands, to which most of

Fig. 14. Campbell Island. Stack off south coast showing volcanic structure.

them are closely related. Both the higher latitude and position further east place Campbell Island in a colder belt and impose restriction on the development of a flora and fauna that appear to have been derived mainly through the Auckland Islands. There is no true forest, but in scattered localities a dense scrub of grass trees (*Dracophyllum*) with a few Coprosmas and *Suttonia*. The greater part of the island is covered with tussock and a variety of herbaceous plants formerly in rich abundance, but much reduced by a long period of grazing by sheep. In the opinion of Cockayne, who first visited Campbell Island about seven years after the establishment of the flocks and at a time when they had increased to about 4500, there had been in the history of botanical science no better opportunity for investigating the effect of man with his introduced animals, fire and plants, upon a purely virgin vegetation. This was because the early botanical survey of Hooker and the later visits of T. Kirk and other botanists had placed on record a remarkably detailed account of the vegetation in its unspoiled condition. This study of induced changes has continued in the forty years since Cockayne's initial work, and at intervals other botanists have described the composition and general condition of the flora. Introduced grasses, although encouraged for years in the vicinity of the sheep station, have not made for extensive replacement of the natives, but the selective feeding of the sheep has resulted in a marked reduction of many succulent plant species and a spread of some not so palatable, a conspicuous case being the lily *Chrysobactron rossii*, as noted by Guthrie-Smith in 1927, and others. If the present intention of exterminating the wild sheep is carried out, there will be a further era of interest to botanists in studying the responses of the vegetation.

Climatically, Campbell Island has similar conditions to those described for Auckland Islands, but seems to have less low cloud, slightly lower humidity generally, a little more sunshine and average temperatures slightly lower. Either for these reasons or because of better drainage its surface is not on the whole as waterlogged and sour as is that of Auckland and Adams Islands.

The terrestrial fauna of Campbell Island is neither as rich nor as markedly endemic as is that of Auckland Islands from which much of it undoubtedly has been derived. Apart from fine taxonomic distinctions that can be made in some groups, there is nothing strikingly distinctive. Flightless forms of insects and birds occur in the same condition at the Aucklands. There is a considerable annual breeding influx of marine birds and mammals. A giant race of the royal albatross makes nests over most of the higher tussock country, dense colonies of mollymawks inhabit the northern cliffs, while the lower slopes of the south coast provide a nesting place for millions of rockhopper penguins. Fur seals still breed at Campbell Island on the more inaccessible parts of the coast, and there is a considerable population, mainly non-breeding, of the southern sea lion, or hair seal. The pelagic leopard seal is a regular visitor and the island is the only one in the groups under New Zealand jurisdiction on which the elephant seal is known to breed. Historically,

Fig. 15. Campbell Island. Upland meadow and coastline south of Northeast Harbour.

Photo: G. M. Turner

Macquarie Island has been known as the regular breeding headquarters of this large seal in the Pacific subantarctic, and early records are vague and indefinite regarding its occurrence on Campbell Island. It is fairly clear, however, that it was never recorded there except as a straggler by the many visitors between 1870 and 1930. At the time of establishment of coast-watching radio stations in 1941 elephant seals were breeding annually, approximately 1000 animals of various ages being ashore at the peak of the season.[9] As the seal oil industry at Macquarie Island ceased in 1918 it is supposed that the herds there may have increased since to a point where a surplus has sought new breeding grounds at Campbell. There also can be recorded a return to winter breeding grounds at Campbell Island of the once-persecuted right whale which in June and July makes its way into the shallows of Perseverance Harbour and Northwest Bay in numbers which bay whalers of a century ago would have regarded as satisfactory.

The human history of the island began with the whalers and sealers when it was discovered in 1810 by F. Hasselborough in the brig *Perseverance* owned by Campbell and Co., of Sydney. The discoverer was himself an early victim of the hazards of a sealer's life, being drowned with two companions when a boat sank in a squall in Perseverance Harbour in the same year. However, his initial haul of 15,000 fur seal skins brought many more sealers, until, in a few years, the yield fell away to an unprofitable level.

In 1840 came the surveys and scientific work of the expedition under Ross; but for the next twenty years little is heard of Campbell Island. It was searched unsuccessfully for minerals by prospectors expecting to find tin and hoping for gold: and a few whalers began to make regular winter visits. The declining years of the oil industry brought vessels whose owners were prepared to deal with whales or seals as opportunity offered. In 1894, for example, a Norwegian whaler, a Tasmanian whaler, and a New Zealand sealer, were all at the island together competing for a meagre haul.

It was about this time that the government offered pastoral leases at Auckland and Campbell Islands, and the latter became a sheep station about 1896. With flocks of up to 5000 sheep, several successive lessees kept their shepherds and shearers in continuous occupation till 1931. The sheep, Lincoln and Romney for the most part, seemed to have been healthy enough, but communication was irregular and the prospect of long isolation was not popular. Some inducement was offered in the way of a limited licence for fur seals, and in 1910 whaling with uptodate methods was also revived, but today the ruins of whaling plant and sheep camp alike are all that remain.

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[9] An estimate of the breeding stock and study of the life cycle has subsequently been prepared for early publication by J. H. Sorensen.

The legacy of more than a century of exploitation is an altered vegetation, a few hundred seals, a thousand or so sheep, and an innumerable population of brown rats. Occupation for scientific observing, however, has been maintained by the government since July 1941, and results of a programme covering meteorology, ionospheric recording and biology, have proved progressively important and valuable.

Antipodes Island

Antipodes Island is situated in latitude 49° 41′ S. and longitude 178° 43′ E. The exact position and orientation of the coastline probably are due for some correction and refinement as existing charts are based on a sketch map made by Captain Fairchild of the New Zealand Government vessels in 1886, with amendments from a rapid survey by H.M.S. *Ringdove* about 1904. The master of the R.R.S. *Discovery II* reported some error in position in 1937.

Although above five miles long from northeast to southwest, and about three miles wide, Antipodes Island has never been properly surveyed and explored and is the least known of all the groups under review in this article. Of its physiography and geology nothing has been published to supersede or improve upon a summary given by R. Speight.[10] Geologists consider that the main island and its outliers are entirely volcanic. The surface is a rough, undulating plateau bounded by remarkably even perpendicular cliffs on the northwest, slightly lower on the east and not more than 150 feet on the south. It rises centrally to 1320 feet (Mt. Galloway) and has a few other cones of lesser height. The whole surface is peaty and waterlogged with extensive swamps in some of the depressions and shallow tarns on the uplands. Streams run in most of the gullies. Meteorological records are lacking, but the appearance of the vegetation suggests abundant rainfall, high humidity and frequent wind. In spite of its lower latitude, Antipodes Island appears to be bleaker and less hospitable than both Auckland and Campbell to the south and west of it. There are not enough air and sea temperatures available to indicate if it is colder, but it lies nearer to the limit line for drifting ice than either of them.

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[10] R. Speight: 'Physiography and Geology of the Auckland, Bounty, and Antipodes Islands.' *The Subantarctic Islands of New Zealand*, Vol. 2, 1909, p. 740, (edited by C. Chilton).

Both T. W. Kirk and L. Cockayne have described the vegetation as being predominantly tussock meadow, interspersed with coarse ferns and numerous herbaceous plants. Scrub, which is mainly Coprosma, also occurs but does not rise above the level of the tussock. This dense mat of vegetation on peaty soil is uniform over most of the island except for its lower growth on high or exposed surfaces. It is not markedly endemic nor rich in species, having about half the number recorded from Campbell Island.

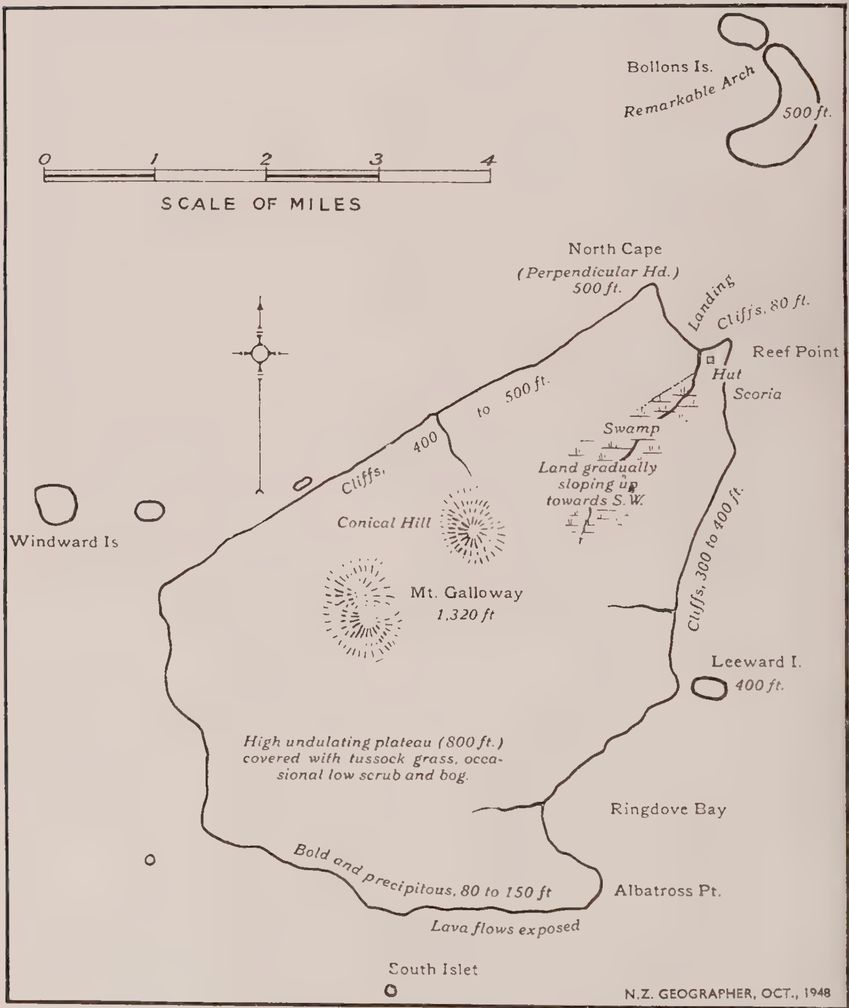

Fig. 16. Antipodes Island. (*With acknowledgements to the Philosophical Institute of Canterbury, New Zealand.*

Zoological work has been so sketchy that the fauna is not yet adequately studied. Birds, being conspicuous, have been listed by most visitors. The land birds are an endemic race of the island snipe, the pipit, and two parrakeets, both of the genus *Cyanorhamphus*. Of these one is just separable from a New Zealander (*C. novae-zelandiae*), and the other, a heavy bird without red or yellow in its green plumage, seems to represent a different and perhaps earlier colonisation. Oceanic birds, in the absence of vermin and predators, breed in great numbers. Two crested penguins share the coastal talus slopes, and wandering albatrosses have something of a surface monopoly of the uplands. Burrowing petrels also make good use of space under plant roots and no doubt act as agents of drainage and manuring. Attempts to establish sheep and cattle for the benefit of castaways were made more than once, but there is no evidence that any of them survived long enough to multiply.

Photo: G. M. Turner

Fig. 17. Antipodes Island. Perpendicular Head and Depot Point.

The fur seals that once made the island famous have not been reported in the last hundred years. If they are in fact quite gone then Antipodes and Macquarie Islands are in this respect unique among the traditional southern sealing grounds. It may be significant that these two islands had a reputation amongst early sealers as haunts of a valuable 'upland seal'. It was never otherwise identified, but may well have been a species more vulnerable than *Arctocephalus forsteri* which has survived elsewhere.

The island came into prominent notice very early in the nineteenth century, being discovered in 1800 by Captain Waterhouse of H.M.S. *Reliance*, and first visited by an American sealer, Pendleton, in 1804. His gang was marooned there for nearly two years, and their return to Sydney with 60,000 skins was the beginning of a brisk run on the

Penantipodes, as they were then called. Seal stocks were exhausted in a very few years and the island faded from notice for fully fifty years. When provision depots for castaways were found to be needed on islands further south, one was placed also on Antipodes and regular inspection thereafter carried out. The depot proved to be necessary, although the first crew of castaways, from the barque *Spirit of the Dawn*, marooned subsequent to the establishment of the depot, failed to find it. It is some indication of the depressing effect of the climate and their surroundings that they lived for eighty-seven days in a cave, without a fire, and made no attempt to explore the island. This was in 1893; and the next and last wreck was of the French barque *President Felix Faure* in 1908. The crew made use of the depot stores and were rescued within two months. Since that date there is no record of anyone having spent more than a few hours on Antipodes Island, for the lack of shelter and distance from any port deters any ship from lingering there.

Photo: E. R. Waite

Fig. 18. Antipodes Island. Tussock meadows and valley swamps. Wandering albatrosses in foreground.

BOUNTY ISLANDS

A cluster of weather-beaten granite rocks rising from the sea about 490 miles east of Stewart Island, the Bounty Islands take their name from

Fig. 19. Bounty Islands. One of the few boat landings.
Photo: *R. H. Beck, by courtesy of the American Museum of Natural History.*

the notorious ship in which the equally well-known Captain William Bligh was sailing when he discovered them in 1788. He saw nothing to tempt him to linger there, but at the turn of the century the sealers, callous of human life and of seals alike, began to maroon their gangs on the Bountys for the slaughter of fur seals. It is unfortunate that there are no first-hand records describing the details of existence by human

Fig. 20. Bounty Islands. All that was left of the castaway depot in March 1926.
Photo: *R. H. Beck, by courtesy of the American Museum of Natural History.*

beings for months at a time on spray-swept rocks, without vegetation or permanent fresh water. When Biscoe called there in 1831 he found a hut thatched with birds' wings, water cask, provision cask and firewood, of which only the bird wings could have been obtained locally. He saw only five fur seals, although it should have been the peak of the breeding season, and it was quite evident that by that time they had been practically wiped out.

The group has had no other significance in history. Provision depots were twice erected with ingenious foundations of heavy bearers anchored under boulders; but they were twice blown away. There is no record of any wreck there, and the briefest of visits have been allowed to scientific visitors, the latest in 1927. Geologists have found nothing but granite, similar to that of Stewart Island. The intervening sea between New Zealand and the islands is shallow, and they stand near the edge of a shelf falling steeply to 2000 fathoms eastward. The surface is polished like glass by the feet of countless birds, or is smooth and greasy from the passage of generations of seals. No vegetation other than algae in the stagnant pools has been recorded. All descriptions of the Bountys seem to follow the same catalogue of bare facts; and then go on to mention the incredible concentration of sea birds. One does not need to be an ornithologist to be impressed with the odour, the noise, or the myriad movement in the sea, or on the rocks, or in the air. Penguins in millions and mollymawks in thousands literally cover the greater part of the surface for the summer months and depart in winter leaving a thick coating of guano and matted feathers carpeting the cracks and hollows. Rain and salt spray remove most of what, in drier latitudes, would soon build up a substantial deposit. In the course of a century some fur seals have returned. The size of the re-established herds is not known, but it is likely to be a thousand or more, and has a very good chance of building up still further.

It is never going to be very easy to visit the Bounty Islands, in spite of a prediction by an American visitor some years ago that aircraft trips to see the birds would soon be mere suburban outings from Dunedin; but the proper preservation and regular inspection of such groups should be regarded as a primary duty. There is both obligation and opportunity also to promote some study of the ocean resources that within small radius support such a vast congregation of birds and mammals.

THE SOLAR SALT UNDERTAKING AT LAKE GRASSMERE

H. A. H. INSULL[1]

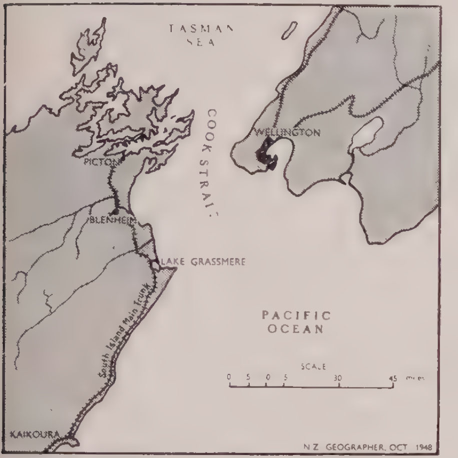

Fig. 1. The central portion of New Zealand, showing the location of Lake Grassmere.

NEW ZEALAND uses approximately fifty thousand tons of salt each year, and all of this at present must be imported. Roughly forty thousand tons are of coarse grade, supplied to meat works, fellmongers, butchers and the dairy industry (for use in factories and for salt licks for sheep and cattle) as well as to many other industrial concerns, while the balance is used for human consumption. Based on the *New Zealand Statistical Report on Trade and Shipping 1939*, the following table gives the details of salt imports into New Zealand from all countries during 1939:—

TABLE I

THE IMPORT OF SALT INTO NEW ZEALAND

	TONS	VALUE OF SALT F.O.B.	COST OF FREIGHT	TOTAL
United Kingdom . .	30,113	£73,416	£180,678	£254,094
Canada	1,059	7,746	5,295	13,041
Australia	17,853	34,503	35,706	70,209
TOTALS	49,025	£115,665	£221,679	£337,344

Owing to shipping difficulties during the recent war, local rubber factories found that not all the caustic soda required for newly completed plants could be obtained. Caustic soda is a product of common salt, and so attention was turned to the possibility of manufacturing salt within the dominion.

There are four principal sources of salt—sea salt, rock salt, brine salt and lake salt. Rock salt is usually mined in much the same way as coal in Europe and elsewhere, large deposits in Europe being in Poland, Austria, Germany and England. Brine salt is obtained by sinking a well (similar to that sunk for crude oil) into the rock salt deposit. Fresh water is forced down to the bottom to dissolve the salt, the fully saturated salt water then being pumped to the surface and evaporated by artificial means. Brine salt is obtained in England and in parts of the United States, notably in the State of Michigan. Lake salt is obtained from several saline lakes in Australia and in the United States. Large areas of land around Salt Lake City are covered for hundreds of miles with a thick deposit of crystallised salt. Sea salt is obtained by evaporating the water from ocean brine.

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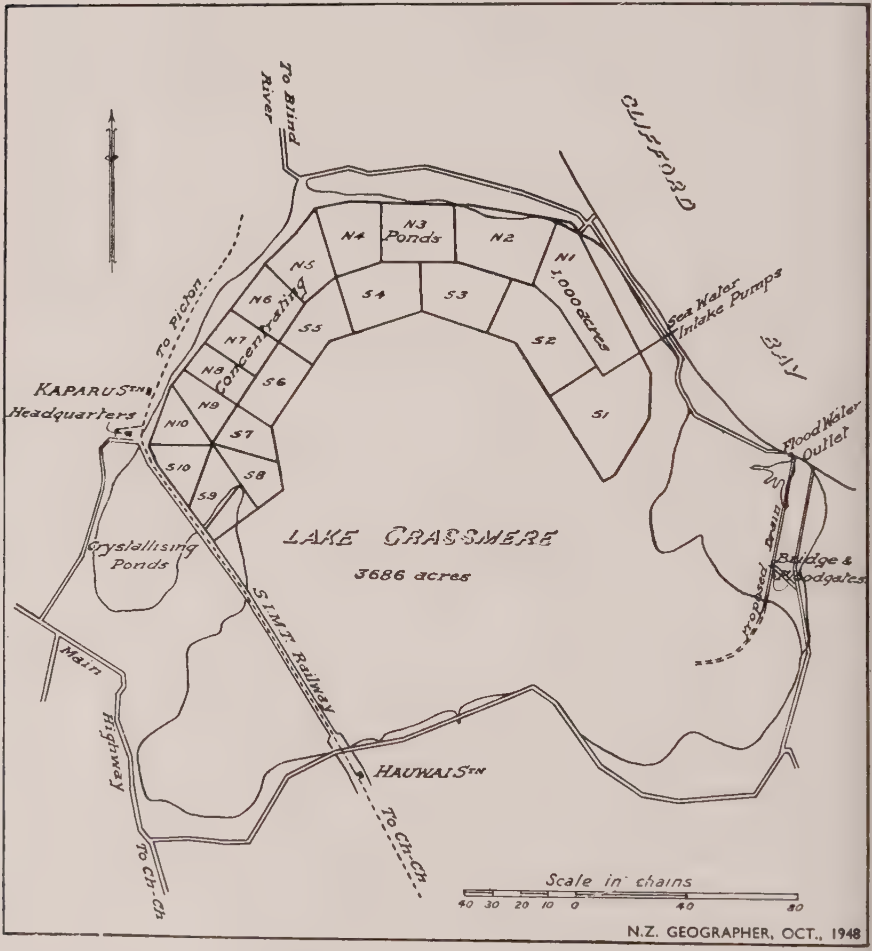
[1] The author acknowledges with thanks the assistance of the manager, officers and publications of the company concerned, in the preparation of this article.



N.Z. GEOGRAPHER, OCT., 1948

Fig. 2. Plan of the Solar Salt Works at Lake Grassmere.

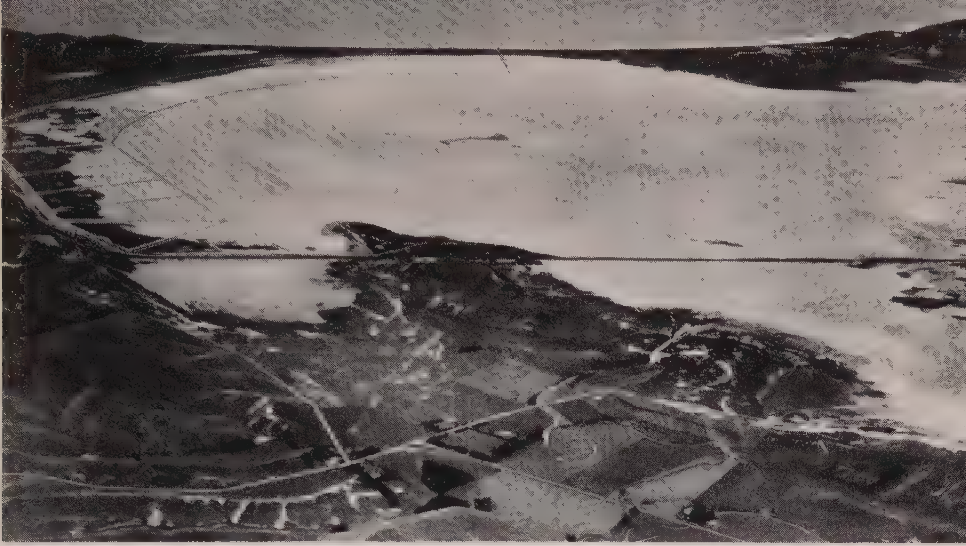


Fig. 3. Lake Grassmere, showing the salt ponds bordering the northern edge of the lake to the left. In the centre background are the intake pumps and pipeline. On the extreme right is Cape Campbell.
Photo: V. C. Browne

PRELIMINARY WORK

After several months of investigation and negotiation, in March 1943 a company finally secured a lease of land at Grassmere in Marlborough Province, and work began immediately on the construction of solar salt works. Since then steady progress has been made with the division of 1331 acres of a lake bed adjacent to the sea into a series of ponds by the building of clay banks, with the construction of roads and electric power lines, with the draining of the lake bed, and with the construction of intake and pumping machinery to provide the salt water.

At the time of writing some millions of gallons of sea water have already been pumped into the 'settling ponds' and the entrapped water is concentrating into brine by the process of natural evaporation by sun and wind. The next stage will be its transfer into crystallising ponds, where the salt crystals will commence to separate out. It is anticipated that the actual production of salt for commercial use will commence in 1949.

The immensity of the ponds is the first impression that strikes the visitor to the works. They vary in size from a hundred to twenty acres and are separated by low banks, through each of which is a connecting culvert to enable the salt water to move by gravitation from one pond to the next. Throughout the process evaporation is taking place, and when the water eventually reaches the crystallising pond, it is in the nature of brine.

The ponds are arranged in two series of ten, skirting the northern side of the lake in a semicircle. They are separated from the sea by a narrow shingle bank through which a massive intake pipe has been laid. The laying of this intake pipe and the installing of a huge silt chamber almost at the water's edge (a great concrete cylinder weighing one hundred and seventy tons) at a depth of twenty feet below ground level have been but two of the major tasks, and although various unexpected difficulties have also been encountered, they have been met successfully. One was the extensive erosion along the twenty miles of dividing walls of the ponds, and this is being overcome by gently sloping them all—a gigantic undertaking. The fall of unexpectedly heavy rains, notably at the end of September, 1946, has been another. However all difficulties have been overcome by the ingenuity and perseverance of the engineers concerned.

TABLE II

CLIMATIC CONDITIONS AT GEELONG AND BLENHEIM

	GEELONG	BLENHEIM
Mean Annual Rainfall	20.45 ins.	23.05 ins.
Mean Annual Temperature ..	58 degrees F.	55 degrees F.
Mean Annual Humidity	71 percent	67 percent

NATURAL ADVANTAGES

Lake Grassmere is surrounded by low hills covering an area of some 11,300 acres, whilst the lake itself has an area of some 3,700 acres. The bed of the lake is remarkably flat and free from channels.

The climatic conditions for the production of solar salt are most suitable. Reference to the *New Zealand Official Year Book* shows that Blenheim (2,304 hours) is exceeded in the average number of hours of bright sunshine taken over a number of years only by Nelson (2,510 hours), Napier (2,416 hours), and Tauranga (2,368 hours). A comparison of corresponding figures at Geelong, Victoria, the site of one of the Australian solar salt works, is given in Table II.

It will be noted that while rainfall and temperature are slightly less favourable at Blenheim, humidity is more favourable. At Lake Grassmere, twenty-five miles from Blenheim, observations have been taken at the works since operations commenced, and since there is more wind and less rainfall than at Blenheim, conditions have been found to be even better. The sun and wind evaporate a certain amount of water, a proportion of which is replaced by rain, so that the important factor, the net evaporation, is the excess of water evaporated over rainfall. The Blenheim evaporation figures as officially recorded show an annual evaporation twice as great as the rainfall, the excess of evaporation being about twenty-two inches per annum. At Lake Grassmere, however, for the first complete year during which records were kept, i.e. from 12 February 1945 to 12 February 1946, the rainfall was 23 inches (which is above the normal), and the evaporation was 28.3 inches in excess of this for the twelve months.

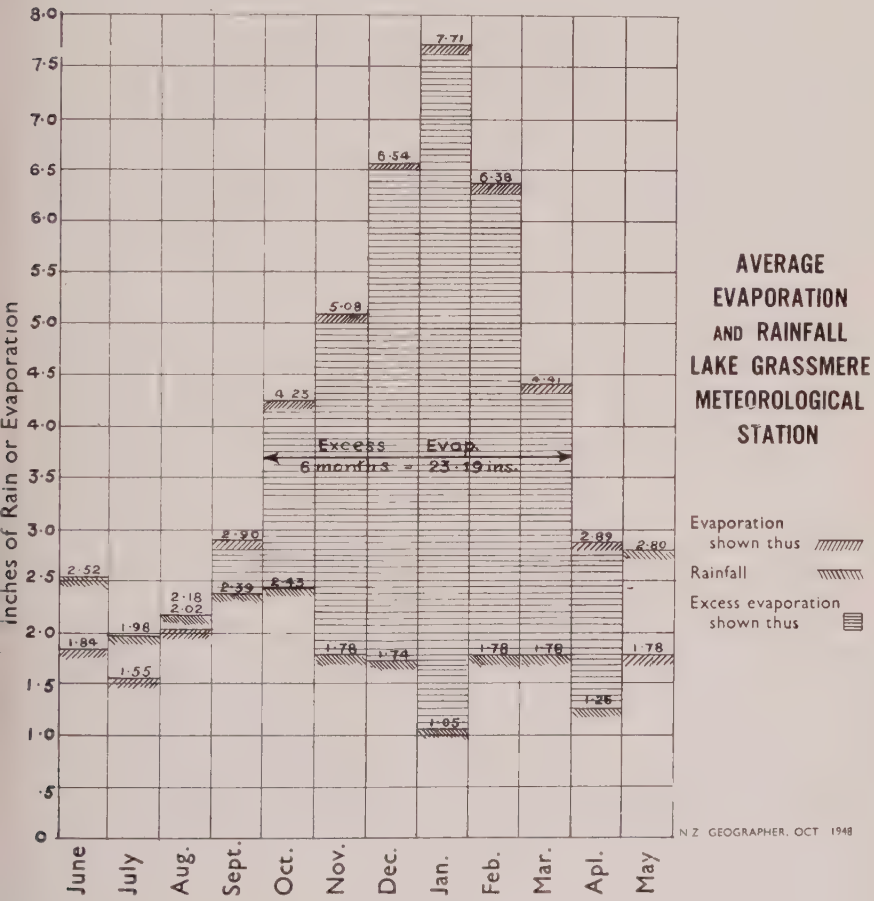


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Fig. 4.

An analysis of the sea water taken from a sample from Clifford Bay (the location of Lake Grassmere) revealed in each hundred grams of sea water a total dry content of 3.580 grams. This dry content held the following: sodium chloride (common salt) 2.787 grams, magnesium chloride .360 grams, magnesium sulphate .238 grams, calcium sulphate

.119 grams, calcium carbonate .014 grams, and traces of potassium bromide and other salts.

Probable Development

This analysis shows a percentage of 2.787 of common salt. The weight of one acre of sea water one inch deep has been calculated as 103.7 tons. Therefore an evaporation of one inch over one acre with a salinity of 2.787 percent produces approximately 2.7 tons of salt. The ponds cover an area of 1,300 acres, and so with a hundred percent recovery the annual harvest would be 80,000 tons. This theoretical figure cannot in practice be obtained. Checks with figures actually obtained at similar solar salt works in other parts of the world lead to the conclusion that when the undertaking is in full operation, the annual harvest will be between 48,000 and 50,000 tons per annum.

The South Island main trunk railway skirts the lake and when the works are in full operation, roughly 3,500 waggons per year or fourteen waggons per day will be needed to take the salt away from Kaparu Station where the headquarters of the works are located. Whether the salt is railed to Picton or to Christchurch, it will probably be the biggest item of freight to be carried on the South Island main trunk line, coal alone excepted.

Salt holds a key position in the manufacturing industries of modern times. Forty-three years ago it was claimed that[2] 'the salt and alkaline industries form the basis of industrial countries. The world's annual production of salt amounts to well over ten million tons. From this salt as parent substance there spring huge industries which are concerned with the manufacture of sodium sulphate, hydrochloric acid, sodium carbonate, caustic soda, chlorine, hydrogen, etc. Out of these industries in their turn spring glycerine, dynamite and other nitro-glycerine explosives, bleaching powder, chlorates, etc. These products in their turn form the raw materials of great trades, which ramify one another. For example, a stoppage in our supplies of salt would cripple the house building trade because window glass would be unobtainable in quantity, since sodium sulphate or sodium carbonate are used in glass manufacture and these products are derived from salt. The production of explosives would stop because glycerine (and incidentally soap) would cease to be producible in quantity, so that mining in turn would become difficult and coal would become dear. The textile and paper trades would be

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[2] Geoffrey Martin: *Salt and Alkaline Industries*, 1905.

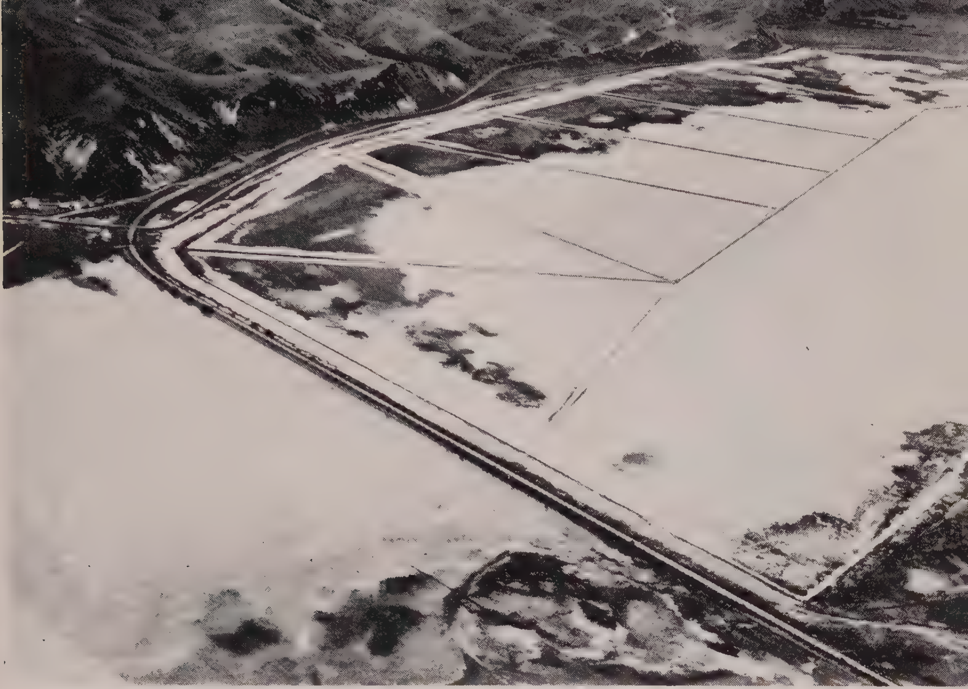
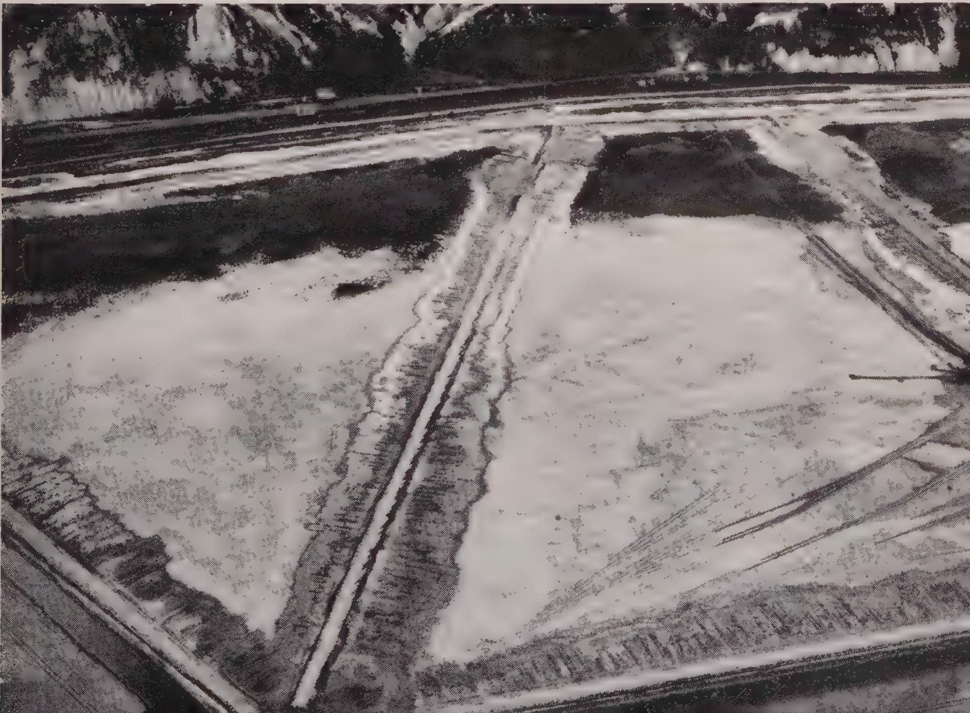


Fig. 5. Lake Grassmere showing Kaparu railway station with the South Island main trunk railway in the foreground.

Photos: V. C. Browne

Fig. 6. Two of the crystallising ponds, showing dividing banks gently sloped to avoid wave erosion. The junction at the bottom left will be the focal point of the crystallising ponds.



crippled, because bleaching, sizing, cheap soap for scouring and other necessary chemicals all derived ultimately from salt, would cease to be obtainable in quantity. These trades would react on other trades in a way altogether difficult to foresee. Such examples could be extended indefinitely.'

Since this was written the use of salt-based chemicals has increased enormously. Salt in its natural form, and with its very wide range of by-products, is used in the home and in industry throughout the world. The activities at the solar salt works at Grassmere promise development into an industry of major importance to the dominion.

COAL FROM THE BULLER

JOHN PASCOE

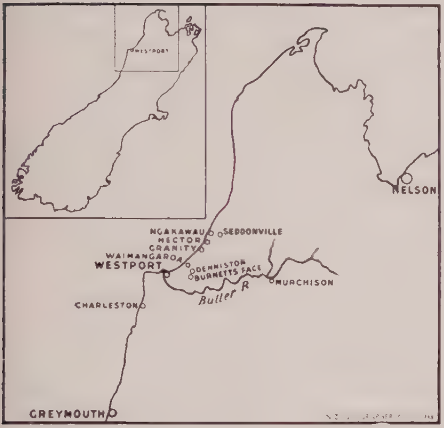


Fig. 1. The northwestern portion of the South Island of New Zealand, showing the position of the Buller coal area.

TRANSALPINE TRIPS had acquainted me with the people and scenery of parts of Westland between Hokitika and Wataroa. Though official tours had taken me to the Buller, I had then passed through, if with regret, as a mere tourist. I wanted a closer knowledge of the district and the opportunities of comparing its mining communities with hospitable prospectors, millhands and farmers of the south. In 1944, the Department of Internal Affairs sent me to make a series of documentary 'still' photographs of mining work and life. On this assignment I had a free hand to go where I pleased. I found the Buller miners had many virtues characteristic of other West Coasters. I seldom had as energetic and interesting a visit as this one, when I met a cross-section of people at work and in their homes, travelled with them, drank with them in the evening, saw their children in the schools and heard points of view varying from mine managers to oldtimers, railwaymen to housewives. The area I covered was bounded by Seddonville in the north and east, by Charleston in the south, and in the west by fishing reefs in the Tasman sea.

Miners are interested in the efficient production of coal. Wartime shortages were made the excuse for constant attacks on miners till the public were conditioned into blaming them personally. Whether New Zealand born or immigrant, the Buller miners constitute typically Westland communities while retaining their trait of aggressive independence. So far from being a public scapegoat, the miner should be respected as a man in the way that a farmer is respected when he overcomes difficulties. As his pay is on a tonnage basis, it is in his interest to produce as much as possible. Because mining conditions were in many cases so bad in the districts overseas from which they or their fathers emigrated, miners have a sectional solidarity that is always on the look out for improvements for safety and efficiency as well as in wages and conditions. They learn a trade from which it is not easy to change, and are on the alert for any attempts to undermine privileges by authority as represented tangibly by mine officials. In their work miners are linked with men of other trades such as carpenters, electricians and transport workers. The life of the townships from which labour is drawn is as closely knit with the mine as hydroelectric workers are tied to their power stations. To understand the industry it is necessary to know factors that superficially considered would lie beyond it. The geographer and the sociologist must be concerned with these factors.

Working Conditions

Buller coal lies in the ranges, on the 'tops', and has been subjected to folding and faulting; and as the resources become less, prospectors and surveyors search for new seams, which, of necessity, are more inaccessible. The climate is reflected in the dense rainforest on the mountain slopes, in the vicissitudes of fog and snow on the tops, and in the deep rivers of the gorges. The merciful strip of coastal terrain has areas whose fertility is voided by sour iron pans of heavily leached podsols—the so-called *pakihis*. Problems of access to mines and mining settlements are considerable. To some mines men must travel by roads whose bends have as many hairpins as the coiffure of a Pompadour, and the coal must rip down the hill on spectacular rope road inclines or be sluiced on a flume through a series of gorges. Though roads show the resource and ability of the engineers many of them peter out some distance from the mine mouth. Then the men must travel the last lap seated and jolted in the empty tubs, or walk. In a climate noted for its rain, this daily travel through bush and past subalpine bleakness is at best a discomfort of singular monotony. Opencast mining too has its problems. Though the lignitic coal of the Charleston opencast field is accessible for lorries, the far more valuable bituminous field opened up at Stockton is served by a road whose description is the ominous half-truth, the 'Burma Road'.

Work in the mine can be done in reasonable surroundings in dry places but sometimes conditions become so wet that water overhead and under foot entitles the miners to fewer hours. When you learn that a 'wet place' by agreement is 'a place in which a workman cannot avoid his clothing becoming saturated with water within three hours of his commencing work or where he has to work in more than three inches of water on the floor' you realise that health is relative to bath-house temperatures and dry clothes at the end of the working day. I had to lend my camera my sou'wester to take photographs of a wet place. Some journeys in tubs up or down an access gorge tramway may include deluges from waterfalls whose spray breaks into the open tubs. No clerk or factory hand would count this treatment justified by any bus service. One miner I stayed with found that in wet weather he risked less from exposure if he made a tramp on foot of several hours over a series of bush saddles instead of returning home by the orthodox tub and bus routes.

It is clear that the native physical toughness of the miner and his robust resentment of those who discount the hardships of his calling are both strengthened by his capacity to endure the double rigour of climate within and without the mine. He may not know details of the discovery of coal in the Buller in 1846 by the explorers Heaphy and Brunner, nor of subsequent pioneers such as Rochfort and von Haast who made further important finds. He may not remember that his father told him that the first mining operations were made in the 'sixties, or that Cooper and Denniston started their topographic and mineral survey in 1873, from which a geologist estimated that 100,000,000 tons of coal were available between Westport and Ngakawau. But he realises that with the construction of inclined tramways to the mines production was established, and that it is his job to keep the tubs full.

HOUSING

A mining surveyor I visited was out. His home was a tent, pitched in a clump of bush outflanked by subalpine tussocks. A cooperative miner I visited was in. His home was spacious, very well furnished and would not have been out of place in any wealthy suburb. Somewhere between these extremes lies the average home of the Buller miner.

Townships where miners live at near sea level are Waimangaroa, Ngakawau, and Hector. Hector gets its pronunciation straight, and is a pleasant assembly of houses on an exceedingly narrow strip between coast and hills. 'Wymang' and 'Konckerwor' are corrupted to versions that no Maori could recognise, and are rather straggly settlements. Seddonville lies inland and has an air of fertility and pasture. Its coal has almost petered out. All these places are far superior in climate and access to the townships high on the ranges. If Waimangaroa could be a mirage of the outskirts of Foxton on a wet day, and Seddonville a piece of King Country, then Denniston, Burnett's Face, Millerton and Stockton could not have their counterparts till you built alpine slums on the Harman Pass or made a shanty town on the grassline of the Tararua ranges. Like all generalisations, the term 'alpine slums' needs explanation. Miners' homes at Denniston or Burnett's Face are not slums inside. They may have comfortable furniture, a radio, good stoves and hot water, but they are sited just where rocks and bogs will let them perch, they rust till their corrugated iron is brown, and acquire all the dourness of temporary habitations. The dream of their owners is that the mountain settlements will one day be rebuilt on the plains near the coast.[1] Under these circumstances it is natural for a man to put money into a radio or a car, and let the paint pot wait. Isolation is none the less grim for being blanketed by rain and fog for many months in the year. Improved housing conditions have been made at some state collieries, but the Buller is behind them in this respect. 'Buller' can mean a first class rugby football team, an hotel, a gorge, a river well known to tourism, or a parliamentary electorate, but it does not spell sunshine and state homes.

Mining Communities

Some aspects of life have values that differ widely according to the community. What could be unusual in Canterbury could be a public virtue in Westland. Behaviour emerges as much from need as from custom. When the high country sheepman takes an hour over his cups of morning tea he is living well in his spells between the exertions of mustering and shearing. When the miner or mill hand spends an evening in the pub it is from reasons that would not prompt a city man to do the same. For the hotels of the mining townships are the community centres of communities that are curiously dependent on centres. Mining is a tough job, and gives an honest thirst and a desire for company. To drink with miners you must be fit, physically, and energetic.

Drinking on the West Coast has an etiquette of its own. It condones none of the 'bob in' touch of a city bar when a man will have the two drinks he wants, and then leave. 'Be in, or be out', you will be told, is the motto on the Coast. That means that each man in turn will 'shout' (pay for) all the other men in the bar or the sitting room, with the publican taking his turn at regular intervals, and the counter lunch provided according to the needs of the drinkers. There is none of the hurried pig swilling of the city rush between five and six. There is no rush about drinking. It is quite normal to find a room full of men drinking, but they can hold their liquor.

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[1] They're moving Burnett's Face, but the old hands stay.

Hence the sociability of Coast drinking. Beer taken slowly and with food makes for interesting backchat and conversation. A background of the haze engendered by tobacco and coal is cards. As staple as beer is, more so is the game of 'forty-fives', impossible of definition, where the five of the trump suit beats all other cards and the table gets a thumping. It accumulates all the good-natured interest and noise of which pubs are capable.

But spare time is by no means confined to what the narrow-minded would regard as questionable recreations. Lectures and discussions under the Workers' Educational Association provoke more interest in mining communities than in most, and the older men are particularly well read. Perhaps because a miner's spare time is so limited, he dishes it out to his necessities of life, such as beer, libraries, political education, instead of an aimless frittering that may afflict less lively people.

The combined enterprise of state, local bodies, mining unions and companies has built tennis courts and swimming baths at Denniston, but the weather is against their continuous use. Dancing is, of course, well favoured; and women, at their Institute meeting, are as likely to dance with each other as wait for a more formal function. The cinema is as popular as in other places. Spare time has inroads made into it also by travel to town on 'pay Saturday'. Once a fortnight mining communities go by car or bus to Westport and do their shopping and see their sights. In interests of sport, miners are characteristic New Zealanders. Their preferences are racing and rugby. They are as good players of rugby as they are spectators. Their physique and toughness gives them an endurance that may puzzle lankier teams and they bet on everything.

Miners' children are little different from other children. They are self-reliant, but not more so than farmers' sons and daughters. They are friendly, alert and sensible of some of the disadvantages of their life. In 1944 Seddonville children spent six hours a day travelling between their homes and their secondary school, which was a bad thing from any angle. Today there is a bus service which takes only one hour. Their normal amenities of education and school services hold good, and the school at Denniston, for example, is the best building in the township. Miners' buses provide transport, and assure the supply of free milk in schools. Sidelines like nature study, a co-operative poultry club, 'seven a side' football, basketball (for the girls) and carpentry flourish in Denniston. When I suggested to the head-master that two boys should take a few hours from school to climb Mount William with me, my idea was not that I needed them as guides, but that I could have an interesting yarn with them as we climbed. When the head called for volunteers, all the older children wanted to go up the mountain, but I had visions of search parties and stragglers, so narrowed the choice down to two. The trip was interesting from every point of view, and the boys may have enjoyed it as much as I did.

TRANSPORT THE DIFFICULTY

Though reports feature stoppages at the minefields because of disputes with the management over bath-house temperature, travel facilities and similar irritations, my own impression in 1944 was that far more serious losses in production were caused by inadequate transport. I had this impressed on me as I froze on a rock above the Denniston incline waiting for a truck or series of trucks to go down filled with coal. After an hour I found that though the first shift of miners had hewn coal for some time, no trucks were then available to take the coal. No trucks were available to take the coal because full trucks were piled up on the Westport wharf. Full trucks were piled up on the Westport wharf because the colliers had not left. The colliers had not left because they could not cross the bar. Because they could not cross the bar, the North Island went short of coal, gas, rail transport and coal by-products. So ran this explanation. But it was not featured in the newspapers, and when cumulative criticism was reported in local papers the miners' wives more than the miners hated the sting. They knew that in winter months their men both left and returned home in the dark, that after their men had paid the cost of explosives and tool sharpening and insurance a good but not an excessive wage was left.[2]

I went to some trouble to confirm this impression of transport. I nipped out of the Buller harbour bar taking soundings with three skippers of colliers that were held up and admired their cursing, and sympathised with the monotonous work of the dredges in the background. I heard arguments whether an open port further down the coast would be better than specially built vessels of shallow draft or the completion of the Buller-Nelson railway. I climbed the Buckland peaks to photograph the mouth of the Buller river from 4300 feet up, and realised how floods took silt down the river, and subsequent storms and cross currents banked it up to form shoals. The bottleneck of transport between mine mouth and consumer was indeed a narrow one.

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[2] For a comprehensive study of the technical aspects of mining written with simplicity refer to *The Coal Miner* by J. D. McDonald and J. Watson in *Postprimary School Bulletin*, Vol. 1, No. 13.

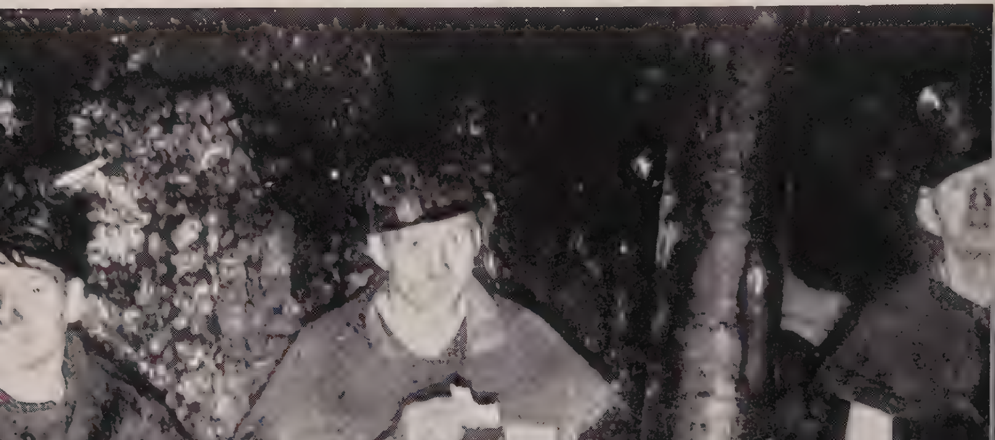
Miners themselves are anxious for the nationalisation of mines. They hold that if this is not done there will be considerable waste as when a fire is allowed to burn a coal seam for a number of years. They look to opencast mining while it lasts to improve both production and conditions, and to mine managers and their technical assistants to encourage efficient development work. Their leaders are interested in reports of the exploitation of further by-products of the coal industry. The extension of mechanisation to underground operations must also be considered as a matter of extreme interest.

With the link up of coal with essentials of industrial transport, production and economy, there are wide openings for the investigator. A better informed public should appreciate miners' problems and encourage them towards solution.

PHOTOGEOGRAPHY

A PICTORIAL SURVEY OF NEW ZEALAND

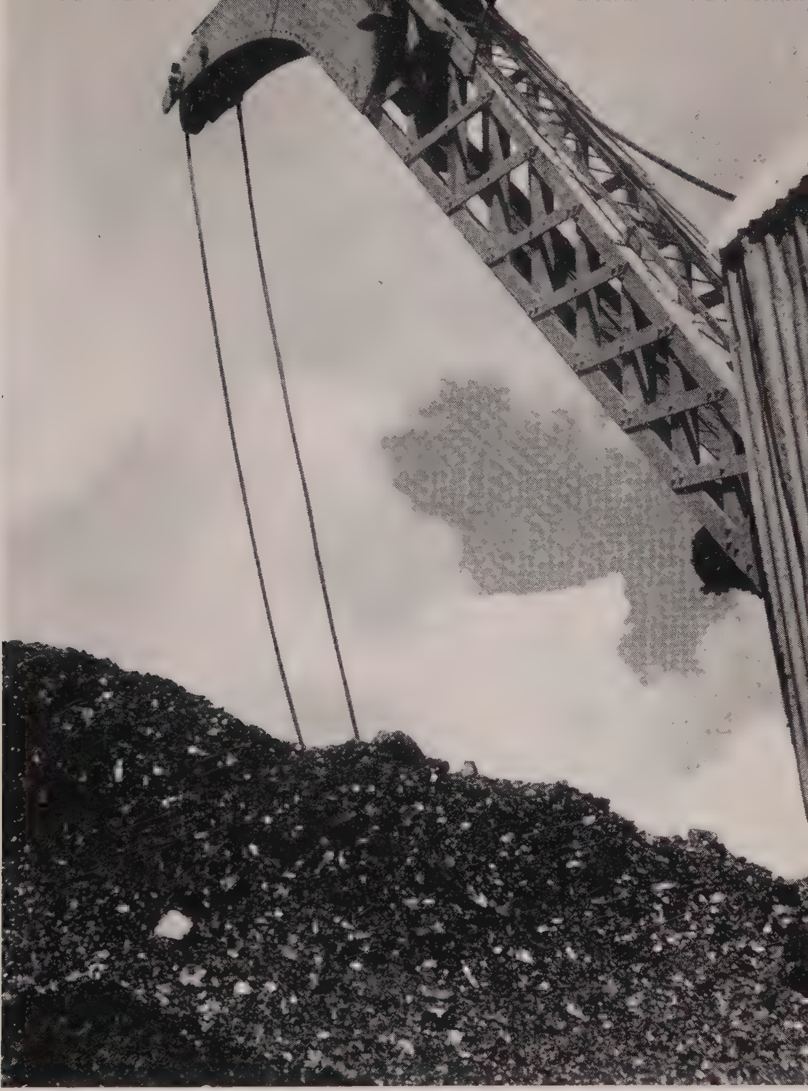
2. COAL FROM THE BULLER



THE MINERS

All photos: John Pascoe
for the New Zealand Department of Internal Affairs

COAL



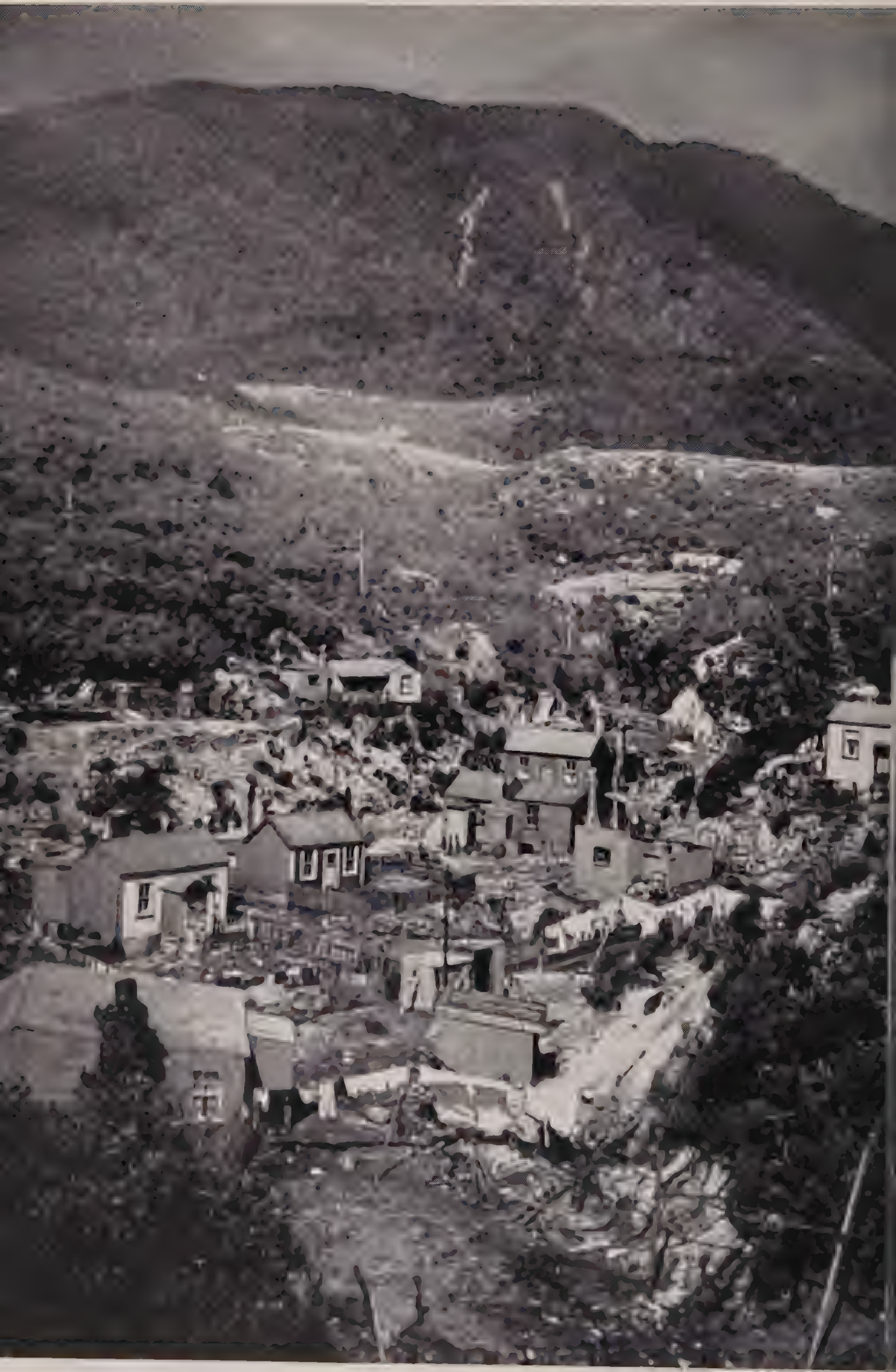
UNION
MEETING

SEA
APPROACH

'WET PLACE'
IN THE MINE

'DRY PLACE'

ARE THESE FUTURE FIELDS?



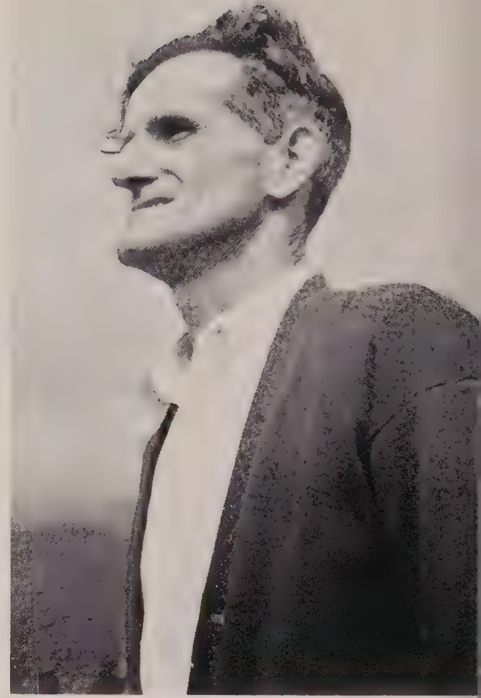
BURNETT'S FACE

WHERE MINERS LIVED

EVERY WIFE'S PROBLEM

MINING TOWN — MAIN STREET

DOLLY



A PARENT

MINERS' CHILDREN

MILK

BASKETBALL

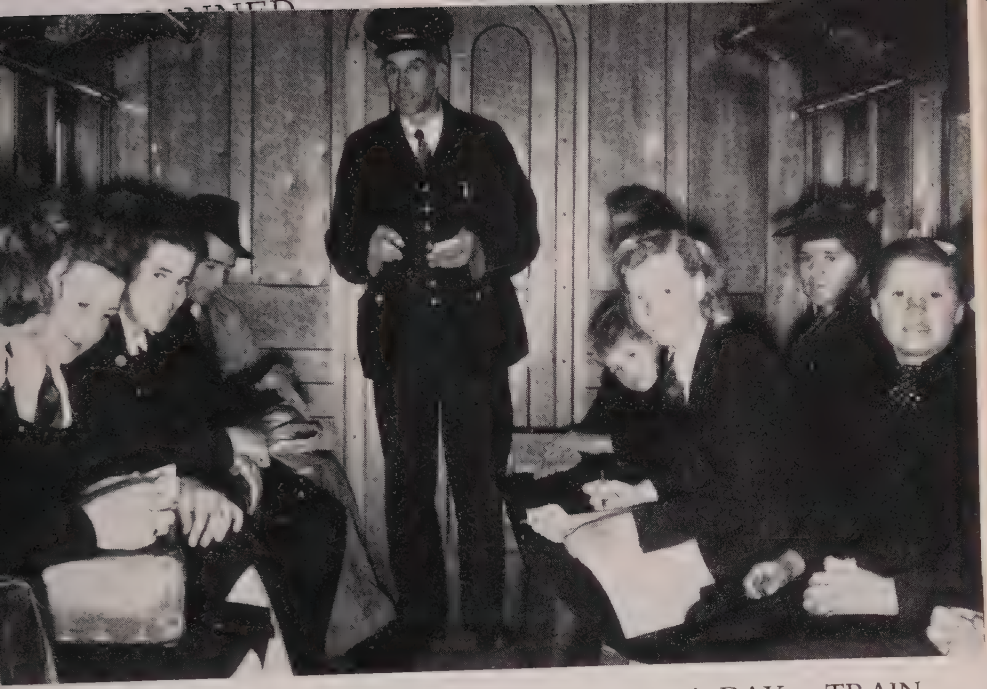
& THEIR SCHOOLS

NATURE STUDY ON AN INCLINE

CASCADE FLUME

COAL TRANSPORT

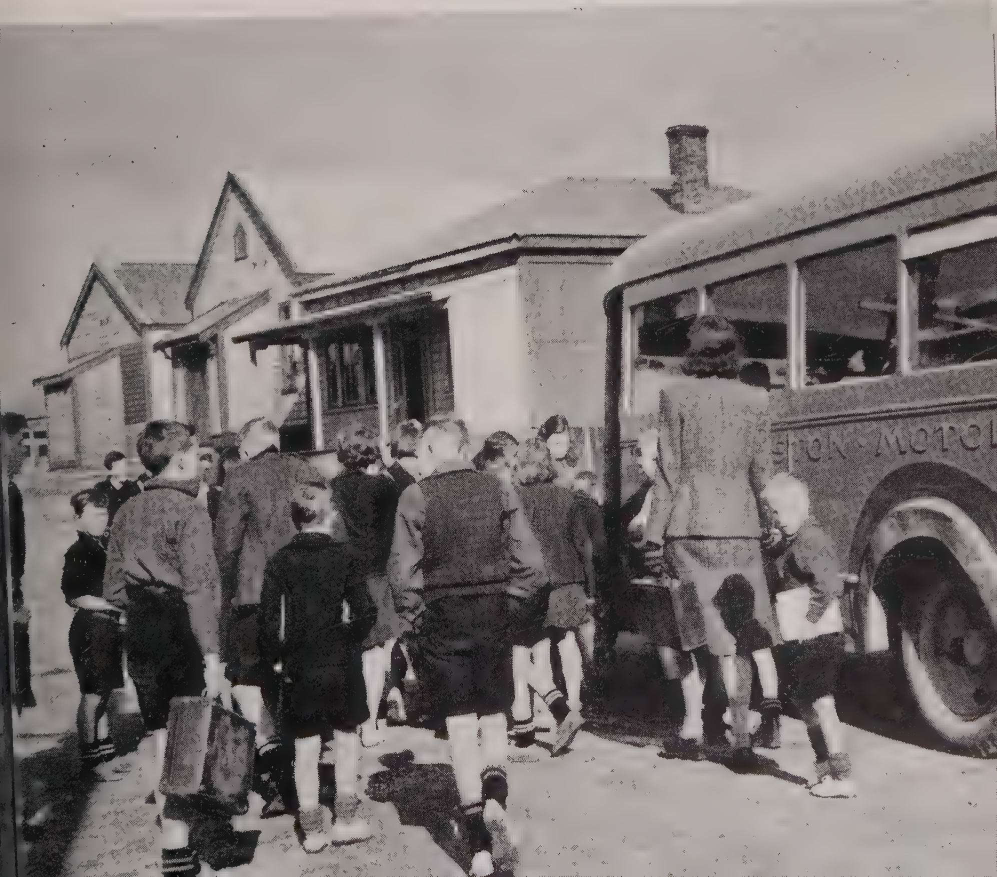
DENNISTON INCLINE



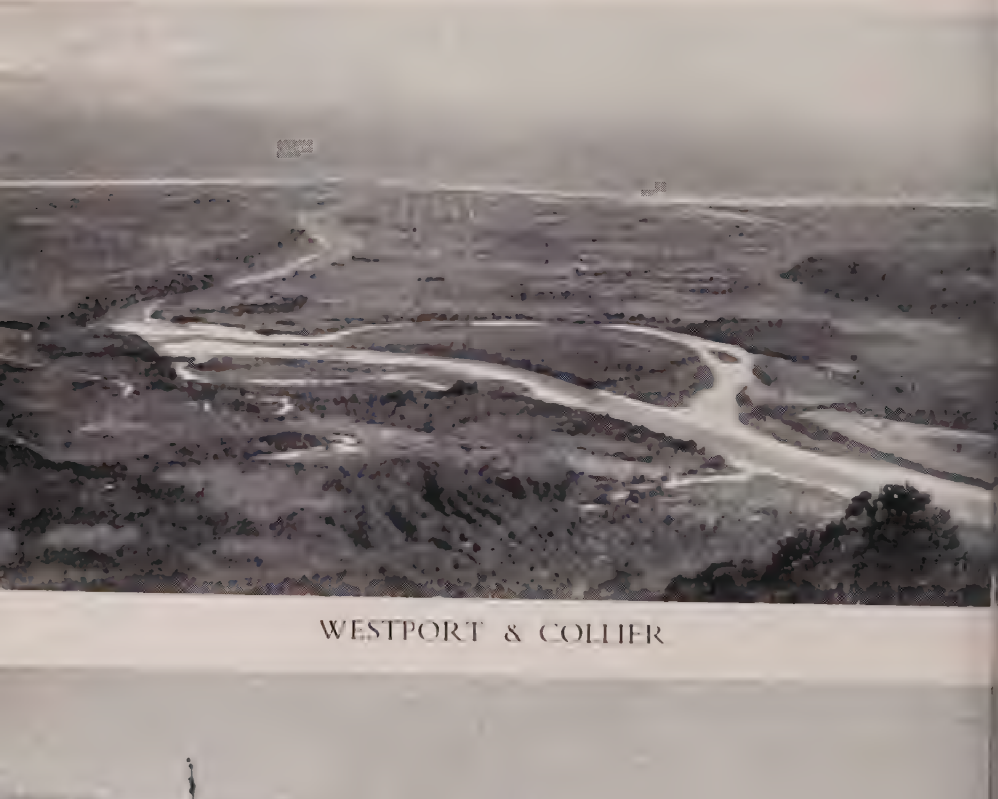
IN 1944 SIX HOURS A DAY — TRAIN

SCHOOL TRANSPORT

BUS



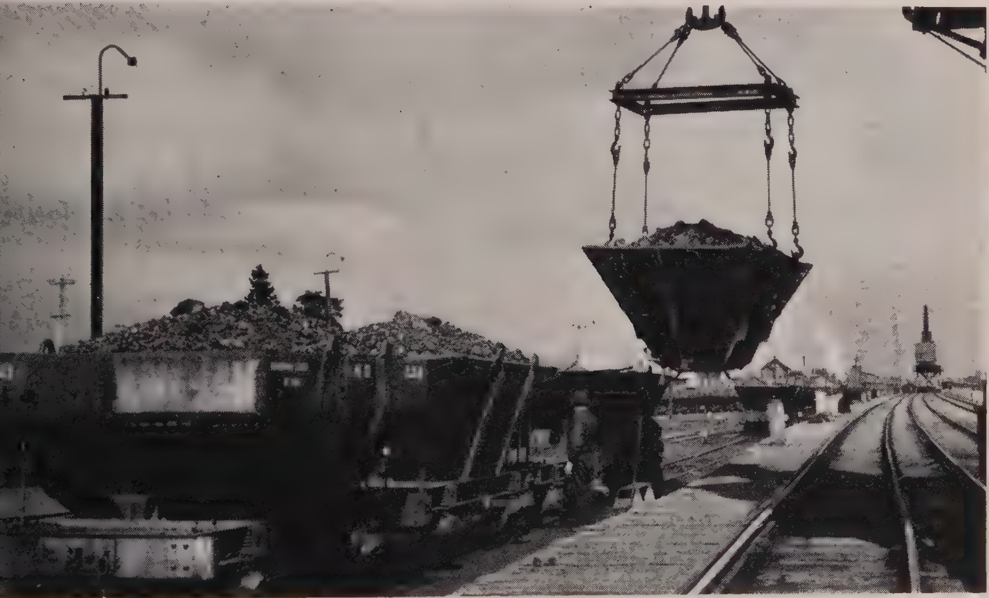
TUBS



WESTPORT & COLLIER

BOTTLENECKS

TRUCKS, WHARVES, SHIPS, DEPEND ON OPEN RIVER BARS



WAGGONS & SCREENING BINS

RECREATION: BEER & FORTY-FIVES

SCHOOL GEOGRAPHY

N. V. SCARFE

GEOGRAPHY has now passed beyond the stage of defending itself as an important school subject, chiefly because there is a large measure of agreement about its content and viewpoint among leading authorities, and because it has proved its worth as a part of training in citizenship. Now that educators are advocating very strongly a greater 'integration' of all school subjects and are stressing the need for closer contacts between children and the real world outside the classroom, geography naturally comes into its own; for the battle of geographers has always been to justify a comprehensive view of man in his setting, and that of geography teachers has been to keep the study in school essentially real and vivid.

For school purposes, geography is conceived as describing two sets of phenomena on the earth so that the relationships between the one and the other are more easily distinguishable and understood, and the pattern of human life and settlement on the globe more comprehensible. The first set of phenomena are clearly the natural conditions or the physical background; the second set of phenomena are the human activities and settlement. School geography, however, is not simply concerned with descriptions of places or descriptions of human beings in groups, but rather with a study of the relations between those descriptions. Geographic facts might be described as the evidences of human adjustment to place, or the resultant of the interplay of man and place. This view does not neglect place or human beings but it represents a shift of emphasis when compared with some previous notions of geography which tended to stress solely descriptions of place as geographic facts, irrespective of their human significance.

The present viewpoint is particularly characteristic of schools because of the methods of study, and of the positive efforts necessary to keep the subject real and interesting. It would seem that best results are obtained when observation and description of the facts of human adjustment to place are the starting points of the geographer's study in schools. The work that men do, the tools they use, the houses they build, the clothes they wear, are often the convenient approaches to school work, for what may seem strange or haphazard is usually cleverly and sensibly related to natural conditions which are effective now, or have been effective in the past. Put in another way, the geographers in school work from observation and description of human adjustment towards the physical background, for the ultimate purpose is to lead children to discover for themselves the influence of physical conditions when presented with evidence of human adjustment in a given setting.

As in geometry the geographic problem starts with certain given data (descriptions of human life and work on the one hand, and descriptions and maps of terrain and climate on the other) and works towards an answer or conclusion which is, in fact, seeing the correlation between the two sets of conditions. This is by no means easy, but it is a natural method of thinking and research, and very different from old methods of teaching which commenced the geographic argument with given physical conditions and, assuming that children knew all about the correlation of things, proceeded to work out by inspired guesswork what the human adjustment would be. The fallacy of this was, of course, that children had no experience or knowledge of how human beings adjusted themselves to physical conditions, either now or in the past, until they had completed a school course and more! The geography teacher is now out of date who thinks that children should start their geography course by learning by heart the world wind and pressure systems, the causes of rainfall, and the conditions necessary for the growth of a range of crops, so that they can work out human activity from such uncomprehended rules. Determinism is almost dead, unscientific methods of learning are dying, and the common representation of the world wind system has been proved so erroneous as to need great modification. The modern method works from the human adjustment toward an accurate appreciation of place so that future citizens can understand how far conditions of place influence political and social conditions in the world around.

Geography as a Unity

School geography from this standpoint is social geography. Because it starts with human adjustment it is human and economic geography. In that it works clearly towards the conclusion that conditions of place make a difference to society it is evident that conditions of place or physical geography are basic to the study. Because children do not divide geography into categories and because, as Vidal de la Blache says, 'Geography is the art of not dividing up what nature has brought together,' it is unusual to find any branch of geography taught separately in schools below the sixth form. Instead of thinking in terms of geography the modern teacher adapts his methods to the mental growth of children and to the ways in which they find it naturally easy to learn. Thus simple descriptive and observational geography precedes that involving relational thinking both in school order and in lesson order. In the primary school descriptive work forms nine-tenths of the course. In tackling new work seniors must start with descriptive data. The term 'descriptive data' is here used to mean simple straightforward evidence in word, picture, map, specimen or statistical form, which has to be studied before it can be understood or interpreted. Text books do the relational thinking for the children (i.e. they are answer books) and so are not normally descriptive in this sense.

In order to encompass the great world at all in a school course, it is necessary to select a few small-scale typical samples of larger regions. This method of detailed sample studies almost inevitably makes school geography mainly regional and not topical in outlook, at any rate at the secondary school stage.

The philosophy of the subject outlined above is very closely related to the methods of teaching in school, and particularly to the positive efforts that all teachers must make to keep geography from being mere words parroted off, or mere map knowledge.

DANGERS OF GENERALISATION

Geography can easily become an unreal study in school for three reasons. The first lies in the nature of geography itself. The world is so large and so full of variety that few teachers can claim to know what it looks like and feels like to live and work in every small corner of the globe. Moreover there is insufficient time in school to teach more than a small amount of geography. The result is that unlike workers in other sciences geographers tend to generalise too soon and from too little detailed evidence. Without a basis of experience, generalisations are unreal. Children are essentially lacking in experience, and in awareness of the significance of experience, and so the great size of the world and the great variety of conditions are difficult for them fully to comprehend. Their world is very small and they find it difficult to imagine the scale on which the world is built or to picture with real understanding areas of continental size. Therefore small sample areas must be studied.

The second reason for unreality arises from the necessary use of symbolism in order to teach this huge world. Words are often learned by children without a full knowledge of their meaning. Geography is about things, not words about things. In order that words shall be full of meaning, experience of local outdoor studies is fundamental to all school geography. For the same reason films, photographs and specimens are essential.

Maps are the tools of geographers, young and old, but not all maps are as easily understood as others. It is necessary first to construct some maps before others can be understood and used. Ideas of scale, direction and the use of agreed symbols naturally arise as children draw their own maps. Those that they draw and use should first be of areas like their school district which they can visualise. The old atlas maps on continental scales teach more wrong ideas than right ones to young children unless several years have first been spent in map making and in reading maps on such scales as 25, 6, 1 and ¼ inches to the mile. Children need to learn the direction and to make a mental picture of the rest of the world from where they stand before they use an atlas. They need to feel that northern France is nearer to England than southern; that New York is nearer than San Francisco. An attempt should be made to visualise the world from and in relation to the school before a map is used to give that picture precision. Much of the unreal geography learned in school is due to the fact that not enough training is given in map making or map reading of small areas. It is particularly necessary to relate the local map to the local area, and pictures of foreign areas to appropriate large scale maps. It is because children find it difficult to imagine large areas that teaching is done by sample studies, involving complete detailed descriptions of small typical areas or units such as farms. Continental outlines mean very little.

The Value of Discovery

Unscientific methods of teaching form the third reason why geography may be unreal. Learning in school involves at least two very important processes, (a) discovering, and (b) mastering knowledge and skill. Both processes require diligent effort and full application of the thinking powers. Both processes require physical and mental activity. Discovery is essentially a scientific process of research. Mastering knowledge requires practice, repetition and application.

Artistic expression work and creative play activity are important means of helping children to master the knowledge they have discovered. In geography it may take the form of painting scenes, or constructing dioramas, or arranging exhibitions, or preparing and acting plays, or collecting and sorting data, or drawing maps, or making written records.

For the initial learning of geography or discovery, the ideal would be to go to the place, but in practice actual visits are very few, and so the teacher has to bring to the classroom whatever evidence and data of the place in question he can secure. Sometimes there is the true vivid travel story, sometimes the traveller himself, sometimes the native inhabitant of the distant place. More often the teacher must rely on a few still pictures or short films chosen for their typicality. Specimens, models and diagrams also help. Then there are official year books and statistical data, and finally but by no means least, maps.

With a particular worthwhile aim or purpose clearly in the minds both of the teacher and the pupils, a certain amount of selected descriptive material or data, as indicated above, is presented to the class and then by carefully chosen questions, exercises, guidance and stimulus, the pupils are set to work analysing and studying the material presented, in order eventually to find out the solution to a problem, or the conclusion to the aim set at the beginning. This conclusion is usually a statement of how certain environmental conditions influence human life and activity, first in the small sample area chosen for study and then in the larger region for which the sample is typical. The discovery of some conclusion or generalisation is only the beginning of the learning process, for there must be, as in all scientific work, proper records of the material studied, of the observations made, of the experiments undertaken and of the conclusions drawn. Maps and illustrations must be drawn to prove the validity of the conclusion. The knowledge is by no means mastered even then, for there must be repetition largely in the form of expression work requiring the reconstruction of the scene or activity studied, in some other convenient medium. In addition, the material must be constantly revised and applied to subsequent studies. Revision lessons (i.e. looking at the material in another way) form an essential part of the course. At the end of a course of lessons covering North America regionally for fourteen year olds such revision lessons as 'The relief of North America', 'The climate of North America', 'The forests of North America', 'The power resources of North America', 'Fruit growing in North America', have proved successful.

It will be clear that the classroom in which geography can be taught must be a combination of a laboratory and a craft room in which wall space for exhibitions and floor space for moving about are essential. Storage space for the materials of study and for constructional materials will also be generous. Unfortunately it will be a considerable time before new school buildings or reconstructed older ones make provision for geography in the same way as for other science subjects.

To summarise the arguments in this article, it can be stated with qualifications that the aim of geography in school is to offer a partial explanation of political and social conditions in the world, and to make the pattern of human life and activity understandable. Many lessons have, therefore, a social or citizenship purpose. The explanation can only be partial because a full explanation could be given only by additional studies in history, sociology, science, etc. The geographer's contribution is to consider how far natural conditions of place, directly or indirectly through history, influence human life, work and outlook. The method of doing this is to apply a scientific research technique, and to start with the more obvious and immediately interesting human adjustments and work towards the physical influences, or in other words, to start with effects and work towards causes inductively.

NEW ZEALAND GEOGRAPHICAL SOCIETY: BRANCH AFFAIRS

CANTERBURY BRANCH

OFFICERS for 1948 are— *President*: Mr. J. Acland
Vice-Presidents: Messrs. A. E. Flower, D. McLeod, and W. S. McGibbon
Chairman: Mr. J. L. Hewland
Secretary-Treasurer: Mr. A. V. Barley *Recorder*: Mr. M. McCaskill
Hon. Auditor: Mr. W. Rosenberg
Committee: Miss M. Aitken, Messrs. Y. T. Shand, A. C. Pitcaithly, H. M. Sweney

The following programme was presented during the year: 'Round the New Zealand Coast by Air' by Dr. G. Jobberns; 'Maps in the R.A.F. in Wartime' by Dr. R. O. Buchanan; a film evening on regions of the British Isles; Presidential Address, 'Population Problems' by Mr. J. Acland; 'The Lime Cycle' by Mr. B. L. Elphick; 'Land Reclamation in the Netherlands' by Dr. de Bruin; and papers by Honours Students of the Department of Geography, Canterbury University College. It is intended to conclude the 1948 session with a Brains Trust on 'Immigration in the Development of the South Island'. During the year the Geography Teachers' Group was re-formed. At the first meeting the constitution was drawn up and the second dealt with visual aids in geography teaching and problems involved.

We offer our sincere congratulations to Mr. B. F. Farrell and Mr. K. W. Thompson who have been awarded Teaching Fellowships at the Washington State University, Seattle; also to Miss Jean Whitehead, now in Australia, who has gained the Sir William Hartley Scholarship which will enable her to study in England. We are pleased to learn that Mr. J. S. Duncan, a past member of this branch, has been granted a Returned Servicemen's Postgraduate Travelling Scholarship under which he also will be leaving for England.

WELLINGTON BRANCH

OFFICERS for 1948 are— *President*: Mr. D. I. Macdonald
Vice-Presidents: Dr. R. A. Falla, Dr. P. Marshall, Dr. J. T. Salmon, Mr. C. G. Bloore
Chairman: Mr. N. E. Dalmer
Secretary: Miss J. K. Finney *Treasurer*: Miss B. Page
Publicity Officer: Mr. D. W. McKenzie *Hon. Auditor*: Mr. T. L. James
Committee: Mrs. S. S. Turowski, Mr. G. Anderson, Mr. R. P. Graham

The following programme was presented during the year:—

March—Mr. James Bertram: 'Travels in the Far East'; April—Dr. R.A. Falla: 'Recent Exploration in the Antarctic'; May—Dr. H. Money: 'Peru'; June—Mr. D. I. Macdonald: 'The International Trade Organisation and its Relationship to Future World Trade'; July—Dr. R. O. Buchanan: 'Maps in the R.A.F. in War Time'; August—Mr. J. W. Fox: 'Czechoslovakia'; September—Mr. L. W. McCaskill: 'Some Problems of Land Use in New Zealand'; October—Members' Open Forum. In addition to the lecture programme four film evenings have been held.

Although the lecture hall was filled to capacity for the meetings in the early part of the year, there was a disappointing decrease in attendance of members during the winter months. This was partly offset by the attendance of visitors, for this branch has followed the policy of issuing special invitations to different organisations and individuals for each meeting as a publicity measure.

We offer our congratulations to Mr. W. B. Harris, Chairman of the Council of the Society and the first chairman of this branch, who has been appointed Information Officer to the Information Secretariat United Nations for a period of two years.

Auckland Branch

Officers for 1948 are— *President*: Mr. L. K. Munro
Vice-Presidents: Sir Albert Ellis, Professor J. A. Bartrum, Professor V. J. Chapman, Professor H. R. Rodwell, Dr. G. Blake Palmer
Chairman: Mr. G. G. Harvey
Deputy-Chairman: Mr. R. A. Watson
Hon. Secretary: Mr. A. L. Ferguson *Hon. Treasurer*: Mr. R. M. J. McDermott
Hon. Auditor: Mr. J. K. Bedbrook *Recorder*: Mr. A. R. Harvey
Committee: Miss I. Kirk, Dr. K. B. Cumberland, Mr. J. W. Fox, Mr. N. Pountney

The year 1948 shows a sustained and developing interest marked by an increasing membership and by well attended meetings. Lectures have been given by Mr. R. G. Lister on 'Le Midi' and by Dr. R. O. Buchanan on 'Geography and the Community', the latter being the address delivered to a large and representative audience at the annual general meeting of the society held this year in Auckland.

Film evenings have again been extremely popular, and as great enthusiasm was shown at other meetings of the branch, particularly when the Brains Trust held the stage and on the occasion of an open discussion on 'Secondary Industries' between representatives of the Farmers' Federation and the Manufacturers' Association.

Other lectures to be given this session include a description of the hydroelectric power resources of New Zealand, a feature by Pan American Airways, and the presidential address.

Otago Branch

Officers for 1948 are— *President*: Mr. B. J. Garnier
Past-President: Dr. B. H. Howard
Vice-Presidents: Mr. P. G. Connolly, M.P., Mr. A. H. Payne, Mr. G. Simpson
Chairman: Mr. E. Hayes
Secretary-Treasurer: Miss D. M. Martyn *Hon. Auditor*: Mr. G. S. Kirby
Committee: Mrs. R. R. McNeill, Miss L. Voller, Mr. N. Dew, Mr. W. E. Earnshaw, Mr. H. I. Sinclair, Mr. D. Sage

The Otago Branch carried out an active publicity campaign at the beginning of 1948, and this has increased its membership considerably. The branch has had good attendances at its meetings this year. In July we held a public meeting which was addressed by Dr. R. Ogilvie Buchanan, his subject being 'The World's Food: A Geographical View of the Postwar Situation'. The meeting was well supported by members and also by others.

'The Face of Otago', edited by Mr. B. J. Garnier for the Otago Branch of the Society and published by the Otago Centennial Historical Committee, appeared in April and was very favourably received.

GEOGRAPHIC NOTEBOOK

CONTRIBUTORS TO THIS ISSUE. It is something over ten years since New Zealand was visited by an outstanding overseas geographer. Dr. R. Ogilvie Buchanan is a graduate of the University of Otago but has hitherto studied and taught geography in the University of London. During his recent visit to New Zealand he addressed meetings of the society in all four centres. In this issue we publish the address he delivered to the annual general meeting of the New Zealand Geographical Society in Auckland on 8 June 1948.

Few, if any, New Zealanders have a more intimate, first-hand knowledge of the little-known island territories of New Zealand south of the dominion proper than Dr. R. A. Falla, Director of the Dominion Museum, Wellington. Dr. Falla is president of the Royal Society of New Zealand and of the Seventh Pacific Science Congress to be held here early next year. It is hoped to follow his present article with another dealing separately with the Chatham Islands.

Mr. H. A. H. Insull is headmaster of Marlborough College, Blenheim. Mr. N. V. Scarfe is senior lecturer in education at the University of London Institute of Education. Mr. John Pascoe is on the staff of the War Histories Branch, New Zealand Department of Internal Affairs. In different ways these three contributors provide valuable material for teachers in an attractive form. Messrs. Scarfe and Pascoe have made earlier contributions to the *New Zealand Geographer*.

Amongst contributors of reviews and other short notices in this issue are: Professor C. A. Cotton and Mr. D. W. McKenzie, Victoria University College, Wellington; Dr. M. M. Burns and Mr. L. W. McCaskill, Canterbury Agricultural College, Lincoln; Mr. B. J. Garnier, University of Otago, Dunedin; Mr. V. F. Fisher, Ethnologist, Auckland Institute and Museum; Mr. C. C. Leitch, Fields Instructor, Department of Agriculture, Christchurch; Mr. W. B. Harris, until recently Supervisor of Teaching Aids, Education Department, Wellington; and the editorial staff.

The article on the Galatea Basin by Messrs. J. W. Fox and R. G. Lister, which was to have appeared in this issue must unfortunately be held over because of pressure on space.

SOCIETY AFFAIRS. At a recent meeting, the Council of the New Zealand Geographical Society received with regret the resignation of its chairman, Mr. W. B. Harris, M.A. Mr. Harris has taken a very active interest in the society since its inception. He was one of the original band of enthusiasts concerned in the formation of the Geographical Association in Christchurch, which later extended itself and provided a core around which the present society was to be built. When the Wellington Branch was established he became its first chairman, and his enthusiasm, tact, and the contacts he was able to make in his position of Supervisor of Teaching Aids in the Department of Education were of prime importance in the development of an active and flourishing branch of the society. In 1944 the society on a dominion-wide basis was established. A central council was set up and Mr. Harris was elected its first chairman, a position which he held until his recent resignation. He has left to take up an appointment as Information Officer to the Information Secretariat United Nations in New York.

The editor, Dr. Kenneth B. Cumberland is also temporarily absent from New Zealand. In July he set out for the island territories in the Pacific to undertake a programme of research into some of the agricultural problems in those areas. In his absence Mr. J. L. Hewland is responsible for the editing of the *New Zealand Geographer*, assisted by Mr. James W. Fox and Miss A. M. Iverach. Miss Iverach, who has long worked hard and unobtrusively in the publication of the society's journal, was appointed an assistant editor at the recent meeting of the council.

M.A. THESES IN GEOGRAPHY. In 1947 no less than seventeen theses were presented by students of Canterbury University College for the M.A. Degree in Geography of the University of New Zealand. The varied list of titles is an impressive indication of current activity in geographic research and of the increasing popularity of geography as a subject for the postgraduate degree. Most of the theses listed here and in a previous issue of this journal (Vol. III, No. 2, pp. 196-197) are deposited in the library of the Department of Geography, Canterbury University College, and are available there for reference purposes on application to the head of the department. The following are the titles of the theses presented in 1947:

Arthurs Pass, Vera N. Anderson;
The Sand-dune Area of Pegasus Bay, L. R. Biggs;
Foxton—Its Site and Changing Function, H. G. Boniface;
The Distribution of Population in North Canterbury, J. S. Duncan;
Greymouth, Joy Goodfellow;
The Lake Coleridge Village Settlement, K. A. Hart;
Metropolitan Christchurch as a Site for Secondary Industries, C. M. Herbert;
Waitara, Taranaki, Betti McK. Johnston;
Le Bons Bay, Banks Peninsula, L. J. Kearney;
Rural Land Use in the Waipaoa Plain, Gisborne, J. H. Martin;
Coromandel Peninsula and Thames Valley—Contrasting North Island Landscapes, M. McCaskill;
Some Market Garden Areas in Metropolitan Christchurch, Daphne B. McKenzie;
The Hanmer Basin, Winifred Mitchell;
The South Island Railway System and the Pattern of Settlement, Edlene Z. Topp;
The Physiography of the Pareora District, South Canterbury, Geraldine Ulrich;
Hawera, South Taranaki, Jean E. Whitehead;
The Cheviot Estate, Neroli Wilkins.

Comparison of the 1947 titles with those of preceding years shows little important change in the nature of the topics chosen for study. The predominance of the Canterbury area is still apparent, although it is significant that five students selected areas in the North Island, including two in the Auckland Province. Of the regional studies two deal with relatively large areas. Only one topic covers the South Island as a whole, and of the seventeen theses only one is a study in physical geography. Urban geography is more popular. There are six such studies, the principal theme in most of them being the relationships between a town and its rural hinterland. In the field of historical geography one student has carried out pioneer work, as far as New Zealand is concerned, in using the population map as an analytical tool. Three large scale maps of regional population distribution at selected census dates were drawn as accurately as available statistics permitted and were used as a basis for explaining the evolution of the present day settlement pattern. Geographers in the United States and Great Britain have already shown the value of this method of historical-geographic analysis and its use could be extended with advantage to many similar studies in New Zealand.

The insignificant place occupied by physical geography in postgraduate research in the university, the preoccupation of students with 'small and often minute areas' and the avoidance of 'problems of nation-wide extent' were the subject of comment in the previous issue of the *New Zealand Geographer*. This situation need not be viewed with alarm. The M.A. thesis, according to the university regulations, is regarded primarily as an exercise in geographic observation and explanatory description. Any value that the thesis may have as a possible contribution to the geographic literature of New Zealand is purely incidental to this primary aim. The preparation of the M.A. thesis is for the majority of students the first exercise in any serious original investigation. Students are expected to develop those qualities which are essential in any research worker—ability to record observations accurately, to interpret them intelligently and to organise material and time. As a training in the aims and methods of geographic research some would argue that the explanatory description of some area, whether it be a town, 'valley', 'catchment', 'basin' or a larger unit, is probably a more effective discipline than a study in one of the systematic branches of geography. An important practical limitation to the size of the area studied is the cost of field work. Comparatively few students are able to afford the expenses incurred in the study of a large region or a dominion-wide topic. Furthermore, the student who lacks previous experience in geographic research work, yet bold enough to attempt the investigation of a dominion-wide topic, may soon become disheartened at the magnitude of the task. There may be some who, from an academic standpoint, would regard the above argument as untenable. It is offered, however, as an explanation of present conditions of research in geography at the M.A. stage. Under no circumstances can it serve as an excuse for mediocrity of attainment in the honours degree.

There is much to support the contention that major research projects in New Zealand geography, such as the study of large regions and of problems of nation-wide extent, should be regarded as the sphere of professional geographers rather than of students still under training. There are already in New Zealand several persons whose previous training and experience in geographic research has equipped them for such tasks. It is these investigators whose work should prove of greatest value to the community in general and to the undergraduate student of geography in particular.

In a country which offers such a wealth of stimulating problems in physical geography, it is indeed unfortunate that this branch of the subject has been neglected in postgraduate researches. The situation is readily explained, however. Under present syllabus regulations of the University of New Zealand the potential student of physical geography finds difficulty in securing an adequate background in such subjects as botany, geology, physics and mathematics. He would be a rash student indeed who would launch a research project in some aspect of physical geography without a sound training in the appropriate physical sciences. When geography has been included among the subjects for a science degree, this anomaly should be corrected, and one may look forward to seeing projects in biogeography, geomorphology and climatology occupy a worthy and significant place among the work submitted for the Master's degree in geography.—MURRAY MCCASKILL.

SEVENTH PACIFIC SCIENCE CONGRESS. All New Zealand scientists, and not the least among them geographers, will applaud both the initiative shown by the Royal Society of New Zealand and the financial encouragement given to it by the government, which together have made it possible for New Zealand to be the venue of the Seventh Pacific Science Congress. Earlier congresses have assembled in Honolulu (1920), Sydney and Melbourne (1923), Tokyo and Kyoto (1926), Batavia and Bandoeng (1929), Vancouver and Victoria (1933), and Berkeley and Stanford (1939). In February 1949 the seventh congress will meet in Auckland and Christchurch under the auspices of the local branches of the Royal Society and of the respective University Colleges, and under the presidency of Dr. R. A. Falla. Dr. Gilbert Archey of the Auckland Institute and Museum is secretary-general of the congress.

The work of the congress is to be conducted in divisions, of which there are ten. There is no separate provision for geography on this occasion; but geographers will find topics for discussion, and symposia to which they will be expected to make significant contributions in the programmes of a number of divisions. Geographers will no doubt take part in the work of the divisions of Meteorology, Agriculture and Forestry, Anthropology, and Social Sciences.

Among the many symposia in the tentative programme in which geographers will probably take part and in which members of the New Zealand Geographical Society are likely to be interested are: Structure of the Pacific Basin; Climatology of the Pacific Region; Protection of Nature and Conservation Problems; Soil Survey and Classification (with Dr. C. E. Kellog, Chief of the Division of Soils, U.S. Department of Agriculture as chairman); Methods of Land Classification in Relation to Utilisation (with a report from Professor J. Wesley Coulter's standing committee on the Classification and Utilisation of Land in the Pacific Area); Changing Agricultural Economy in the Pacific Islands; Demographic Problems in the Pacific; and Economic Resources of the Pacific Area (being organised by Mr. R. G. Lister of the Department of Geography at Auckland University College).

A number of eminent overseas geographers including Professor J. Wesley Coulter of the University of Cincinnati, Professor G. T. Trewartha of the University of Wisconsin, Professor J. Macdonald Holmes of Sydney, Dr. Walter C. Lowdermilk of the U.S. Soil Conservation Service and Dr. J. Lossing Buck of China will be preparing reports and papers for the congress. The congress promises to be an event unparallelled in the history of science in New Zealand, and especially so in the development of geography. It is hoped that among the visiting scientists will be geographers who will be able to 'stay on' in the dominion for some time after the congress is over and to take part in the work of the university departments of geography and the branches of the society.

The New Zealand Geographical Society is not formally assisting in the lengthy and laborious business of organising the congress, although Dr. Kenneth B. Cumberland is a member of the Organising Committee and other geographers are members of local committees in Auckland and Christchurch. At its meeting in May last the Council of the New Zealand Geographical Society decided to appoint two official 'members' of the congress to represent the society in Auckland and Christchurch. It is confidently hoped, however, that professional geographers, members of the society and those others interested in the subject will take the opportunities presented by an event such as New Zealand in its isolation has not previously experienced, that they will enrol as 'participants' in the congress by paying the nominal fee and that they will attend its many and varied meetings.

WORLD FOOD SUPPLIES. The staff of the Food and Agriculture Organisation of the United Nations prepared a series of reports on the postwar food situation for the information of delegates to the F.A.O. conferences at Geneva. These reviews give an account of the situation at the beginning of 1948 in different countries, with the latest statistics available. In view of their interest to New Zealand as a food-producing country, extracts are of great value. One entitled *Livestock and Meat* gives the following figures before going on to set out the postwar position.

LIVESTOCK NUMBERS PER 100 INHABITANTS IN SELECTED COUNTRIES

Country	1935–1939			1946 as percent of prewar. (1938 boundaries)		
	Cattle	Hogs	Sheep	Cattle	Hogs	Sheep
Argentina	265	29	352	102	126	127
Australia	193	17	1620	104	121	87
Belgium	32	12	2	87	58	94
Brazil	95	55	30	103	—	98
Canada	78	35	30	121	144	93
Denmark	84	83	4	97	57	108
France	37	17	23	91	62	68
Germany	29	37	7	86	40	77
Ireland	136	31	76	103	48	79
Netherlands ..	31	18	8	90	67	85
New Zealand ..	292	48	1933	107	73	107
Norway	47	14	60	92	62	98
Poland	30	21	9	38	40	23
Rumania	21	16	63	—	—	—
Sweden	47	21	6	98	77	125
Switzerland ..	38	22	4	90	69	110
United Kingdom ..	18	8	55	111	44	78
United States ..	52	37	41	122	128	80
Yugoslavia ..	27	20	64	59	88	66

In the years immediately preceding World War II, income from livestock commodities approximated eighty-five percent of the total agricultural income in New Zealand; forty-three percent in Canada; sixty-five percent in Belgium; eighty-five percent in Denmark; seventy percent in Poland; and fifty percent in the United States. Prewar trade in meat between nations consisted largely of imports by the United Kingdom from Argentina, Australia, Brazil, New Zealand, Canada and Denmark. Germany and France also imported large quantities, but compared with the United Kingdom their significance in the world meat market was slight. Total meat supplies entering the international market (excluding live animals) during this period comprised roughly forty percent beef and veal, forty-four percent pork (including lard), and sixteen percent lamb and mutton. New Zealand exported about sixty percent of its 1934-1938 production; Denmark, fifty-eight percent; Argentina, thirty-four percent; and Australia, twenty-three percent. The United Kingdom imported about seventy to eighty percent of the total meat entering international trade, taking ninety-four percent of the world's total export of lamb and mutton, seventy-six percent of the pork, and sixty-five percent of the beef and veal.

Livestock numbers in the principal importing and exporting countries were variously affected during the war period. In the major exporting countries of the western hemisphere, livestock numbers, particularly cattle and hogs, increased; whereas in the major importing countries of Europe, numbers were decreased substantially. Availability of feed and favourable prices encouraged production in the exporting countries. Scarcity of feed, particularly concentrates, caused declines in the European countries, the principal reductions being among the grain-consuming animals, hogs and poultry. Decreases occurred in all European countries except Ireland, which showed an increase of thirteen percent over the prewar average. The biggest decreases occurred in central and southeastern Europe where livestock numbers, particularly hogs, were drastically reduced. For example, Poland's meat production in 1945 was only twenty percent of prewar. Declines in production were smallest in northern Europe although even here 1945 production was only seventy percent of prewar average. Germany and Austria were hardest hit among countries in this area, and their total meat production in 1946 was only about forty to forty-five percent of the prewar average. In Italy, Belgium and the Netherlands the total reduction amounted to about fifty to fifty-five percent; in the United Kingdom and Denmark to over thirty percent; and in France and Norway to about twenty-five percent. In Sweden the reduction approximated only five percent.

The United States and Canada, which produce more than ninety percent of the North American meat output, accounted for forty percent of the world's total in 1946 as compared with twenty-six percent in 1934-1938. In Argentina, Brazil and Uruguay some decline occurred during war years, although Argentina expanded pork production. Australia and New Zealand produced about five percent of the total world's meat supply in the 1934-1938 period, and their production of lamb and mutton accounted for about twenty-seven percent of the world's total for this class of meat. Australian mutton production increased during the war period by about one third. In 1946 total meat production was about six percent above the prewar average in New Zealand and about six percent below prewar in Australia.

Early in the war period some major shifts in the pattern of world meat trade took place. Although the United Kingdom continued to be the predominant importer, its sources of supply changed. As the war progressed, the United States again entered the market as a major supplier, and at the same time shipments from Canada and Argentina increased greatly. The United States, a net importer of meat in the prewar period, reached a maximum level of net exports in 1943 with a volume of 1.04 million tons, outranking all other exporting countries. During this same period Canada increased its meat shipments to 623 percent of the prewar level. Exports of meat from Australia and New Zealand also showed some increase. The United Kingdom's total imports (in product weight) also showed some increase; in 1943 the level was about fifteen percent above the 1934-1938 average, and it remained high in 1944; but the volume of imports dropped substantially in 1945.

Following the end of the war in 1945, there were again significant shifts in export trade. Denmark resumed its trade with the United Kingdom but on a very reduced scale as compared with prewar; it exported about one-third of its production in 1946. United States exports declined and the portion which was supplied to UNNRA during the latter part of 1945 and in 1946 and part of 1947 assumed a different pattern of distribution. Estimated exports for 1947 from the United States were however only about ten percent of the high level reached in 1943. Canada's exports remained high in 1946 but were much lower in 1947. Exports from the other major countries did not change materially. The United Kingdom's imports in 1947 were at approximately the 1946 level and about the same in volume as in the prewar period. However they now represented a larger percentage of world imports, amounting to about ninety-five percent of the total.

THE LANDSCAPE OF THE ACHERON VALLEY SYSTEM. One's first view from the air of the country between the great bend of the upper Clarence and the headwaters of the Awatere River gives unexpectedly an impression of age-old maturity of landscape—no wild gorges; no scenery in the usually accepted meaning of the word; but uniformity, not to say monotony, of form. Here is a district more than 500 square miles in extent all maturely dissected (without trace of *Gipfelflur*) on a greywacke terrain without apparent structure. The northerly and northeasterly valley trends are probably related in some way to great faults rather than to bedding and folding of beds in the greywackes.

Though separating upheaved mountain masses, the Kaikoura ranges to the east and the Spenser Mountains to the west, the hollow occupied by the Acheron and associated rivers is not now actively negative. It retains a relief of several thousand feet. Though seamed by long fault cicatrices following rectilinear valleys, which in places cause some ponding of minor drainage and which indicate perhaps a recent awakening of long dormant seismic activity, this whole area has the appearance of having rested in a stable condition for many thousands of years. It is neither terraced nor much aggraded; it is long, therefore, since it writhed. It is a land of small meandering rivers in mature though narrow valleys. Even the new streaming of rock debris from soil-eroded hills in the vicinity of Molesworth has not yet greatly affected the valleys of the streams which later on will be burdened with the task of carrying it away.—C. A. Cotton.

WHEN PEDAGOGUES MEET. During 1947 informal discussions and meetings among the teachers of geography in Auckland showed that there was a real demand for some organisation within which topics of pedagogic interest might be debated. Accordingly there came into being in Auckland a Geography Teachers' Association, the aims of which are 'to encourage the better understanding and teaching of geography by means of talks, demonstration and mutual discussion'.

At two preliminary meetings the constitution of the association was agreed upon and the officers elected. All types of schools, the teachers' training colleges and the university are represented on the committee, the chairman being Mr. James W. Fox and the secretary Mr. Nelson Pountney. In March 1948 the first meeting proper was held to discuss the School Certificate and University Entrance Examinations, and was followed by a second meeting at which Mr. Fox gave a report on the work of the Geography Teachers' Refresher Course held at Oamaru in January 1948. At the third a discussion took place on the use and content of a primary school atlas, whilst on the fourth occasion Mr. F. R. G. Aitken gave a general talk on the scope and content of school geography.

The topics covered by these discussions and talks have been wide, and although concerned mainly with the work of teachers in secondary schools, they have not been exclusively so. Many of the difficulties encountered in the teaching of geography in primary and intermediate schools are ultimately reflected in the work of secondary school pupils, and it is in the solving of some of these problems that the association can play a useful part.

Yet the association will not confine itself to mere discussion. A series of publications is envisaged, the purposes of which will be first to codify the matters discussed and so provide readily accessible reference material, and secondly to bring within the orbit of the association the less fortunately situated provincial schools. A similar organisation has been formed in Christchurch, with the same aims, with Mr. A. C. Pitcaithly as chairman and Mr. T. W. Curr as secretary. After the preliminary meeting had revived the Teachers' Group which had been active before the war, and had elected officers, a general meeting was called to discuss the problems which teachers found in the use of different visual aids. The next meeting is to be devoted to the question of obtaining some continuity of syllabus through all the stages of the education system. Much has yet to be done in the organisation of geography teaching in all kinds of schools; much can be achieved by the ready interchange of ideas and the appreciation of individual problems.

IN OUR CONTEMPORARIES . . .

1. *In New Zealand Journals . . .*

The South Island's Northern Provinces

A SURVEY OF RURAL NELSON AND MARLBOROUGH: F. R. Bray, *New Zealand Journal of Agriculture*, Vol. 75, No. 6, December 1947, pp. 533-542, and *ibid* Vol. 76, No. 1, January 1948, pp. 49-57, and *ibid* Vol. 76, No. 2, February 1948, pp. 167-175.

The title of this series of articles is somewhat misleading. In so far as it is a survey, it deals mainly with the country towns, townships and villages in the area rather than with the farms which are the basis of its rural life. Moreover it tends rather to conceal much of the factual material collected during the investigation in a mass of sociological reflections. One other complaint is the length of the articles, a complaint this reviewer has to make about articles in this journal generally. If one aim of the survey was to give the urban dweller 'an appreciation of rural life and its importance to the country', and this is surely a very laudable aim, it would have been more effectively achieved by considerable abbreviation.

At the same time the student of the geography of the area will find much of interest in the material collected by Mr. Bray; much, too, to cause him concern. Between 1936 and 1945 the decrease in the county population of the two provinces was 3884 and it would appear that this depopulation, partly due to the exhaustion of natural resources, must continue unless there is instituted a progressive policy of forest conservation and land development; two concepts which are not necessarily antagonistic.

An outstanding impression received by Mr. Bray as the result of his tour was the very limited area of high class land capable of intensive cultivation, as well as the extremely wasteful use that has been made of large tracts of hill country in both high- and low-rainfall areas'. Yet another was 'the spread of urban development over highly productive land', and from this the author goes on to raise the question of land use on a national scale. 'With an expanding population, how far is it possible to reconcile the use of good land for residential areas with a cheap and abundant supply of fresh fruits and vegetables or with near contact with natural scenery?' Mr. Bray's solution to a problem which is becoming increasingly acute in other parts of New Zealand particularly near Auckland, Wellington, Christchurch and Dunedin is the establishment of 'a permanent national council empowered to investigate and supervise land use as a whole, both urban and rural, and on a national scale'.—L. W. McCaskill.

New Zealand Farming

FARMING IN NEW ZEALAND; INTENSIVE GRASSLAND FARMING: P. W. Smallfield, *New Zealand Journal of Agriculture*, Vol. 75, No. 6, December 1947, pp. 577-591, and *ibid* Vol. 76, No. 3, March 1948, pp. 259-269.

The previous articles in this series traced the development of New Zealand farming up to 1920. In the first of the two under present notice Mr. Smallfield covers the progress made in the last quarter of a century. He considers that the period will be remembered in farming history as one when farmers first felt confident to exploit to the full the use of fertilisers, lime and selected strains of grasses and clovers in pasture development. 'These were the tools which were used . . . . not only on the more fertile lands but also on much inferior ploughable land in the high-rainfall areas. By, as it were, building a veneer of fertility on these scrubland heaths the apparent paradox was created of pastures growing high-class milk-producing fodder being established on apparently unchanged and naturally-sterile soil'.

Although the sown grasslands increased by only one and a half million acres, the productivity of the areas in grass was so greatly increased that livestock carried increased by nine million breeding ewes and one million dairy cows. Mr. Smallfield stresses the fundamental place that clover plays in modern intensive grassland farming. Phosphates and lime give the necessary stimulus to clover which in turn stimulates the grasses, especially perennial ryegrass. More livestock can thus be carried. This in its turn means more animal manure with further benefit to grass growth. The extra grass growth permitted a reduction in annual crops for supplementary feeding, and hay and silage made from permanent pastures became the chief supplementary feeds over most of the North Island.

Mr. Smallfield deals at some length with the problems of reversion and of soil erosion on the North Island hill country, and stresses the necessity for a higher ratio of cattle to sheep if the surface-sown grasslands there are to be maintained at their present capacity. He believes that this will not be possible until suitable edible shrubs are found for planting on hill country to provide winter feed for cattle.

The second article discusses the developments which took place between 1920 and 1945 in annual crop production and in the meat industry. The outstanding change during the period was the decline in the area devoted to oats by some 300,000 acres. Motor transport replaced horse-drawn transport on the roads and the tractor replaced the team for cultivation and harvesting. The wheat acreage during the period fluctuated chiefly as the price of lamb fluctuated, and it is doubtful if the present figure of 200,000 acres would have been attained in New Zealand but for the introduction of the header harvester.

Swede and turnip production fell by about 200,000 acres but part of that loss was made good by a rise in the area of chou moellier which increased from 1000 acres in 1931 to 78,000 acres in 1945. The loss in these fodder crops was more than replaced by the increased production of lowland pastures and by the amount of hay saved from pastures and lucerne.

An important wartime development was the local production of seed of all the brassica crops. So successful has this been that there is now produced sufficient seed to sow the 500,000 acres at home as well as to provide a surplus for export.

The period was marked by a large rise in ewe numbers in districts with flat and undulating land where pastures could be easily improved as opposed to the stationary or declining numbers on the hill country. Concentration on the production of fat lambs led to an increase in the use of the Romney ewe and of the Southdown ram, and to a decline in the percentage of dry sheep to breeding ewes. Mr. Smallfield also deals with wool improvement, the important features of meat production from grass during 1920 to 1945, the expansion of fat lamb production, the export of chilled beef, and the contributions of beef, veal and pig meat from an expanded dairying industry.

SEED PRODUCTION IN NEW ZEALAND. This is the title of a series of articles in the *New Zealand Journal of Agriculture* which describes the production of pasture seeds in this country. An essential prerequisite to good grassland farming is an adequate supply of high-quality grass and clover seeds. Although the export trade in our seeds receives much publicity, the main purpose of seed production here is to supply the seed required to sow the 500,000 acres put back to grass each year. Articles which have so far appeared are:—

The Grass and Clover Seed Industry: J. H. Claridge, Vol. 76, No. 3, March 1948, pp. 231-235; Chewings Fescue: W. Faithful, Vol. 76, No. 4, April 1948, pp. 331-336; Crested Dogstail: A. Stuart, Vol. 76, No. 5, May 1948, pp. 431-433.

—L. W. McCaskill.

FARMING IN NEW ZEALAND; NORTH AUCKLAND PENINSULA: E. B. Glanville, *New Zealand Journal of Agriculture*: Vol. 76, No. 5, May 1948, pp. 456-464.

This is the first of three articles on an area of New Zealand concerning which there has been very little published information available to the student of geography. It was here that agriculture in this country began, suffered an eclipse when first timber and later kauri gum became the major products, and with the building of modern roads returned to preeminence. North of Auckland there are 6000 square miles of land, of which 1,350,000 acres are in grass and only 5000 acres in annual crops.

Variation in soil type is greater than in any other area of similar size in New Zealand, but on even the difficult soils prolific grass growth can be induced. A favourable climate—absence of extremes of temperature, with heavy and well distributed rainfall—together with the regular use of lime and phosphate on pastures in which paspalum is an important constituent, make the area ideal for butterfat production with beef and fat lambs as secondary products.

Because of the initial poverty of the heavily leached soils the early farming was largely extensive, new areas being regularly brought in from the bush as the older pastures deteriorated. Today with good roads making lime and fertiliser readily available intensive grassland farming on smaller areas is more generally practised. Even on the intractable gumlands high-producing swards can be developed by summer fallowing, by sowing certified strains of grasses and clovers with the addition of paspalum, and by the adequate use of lime and phosphate. Even the problem soils such as the ironstones and peats are being farmed successfully by introducing the deficient minerals, cobalt and copper respectively. Some idea of the effects of this modern grassland farming can be gained from the fact that in the last twenty years butter production has risen from 10,000 tons to 23,000 tons per annum.

Because of the high rainfall—it is over 100 inches in places—soil erosion is a problem on the steeper hill country. The solution to the problem is the maintenance of a tight pasture cover, but this is a difficult matter except where regular topdressing can be carried out.—L. W. McCaskill.

Climate and Soils

SOME POST-GLACIAL CLIMATIC CHANGES IN CANTERBURY AND THEIR EFFECT ON SOIL FORMATION: J. D. Raeside, *Transactions and Proceedings of the Royal Society of New Zealand*, Volume 77, Part 1, April 1948, pp. 153-171.

This paper, one of the few to have appeared in the *Transactions and Proceedings of the Royal Society of New Zealand* under the heading 'Geography', begins with a review of the literature on postglacial climatic change and continues with an account of the author's own observations.

Mr. Raeside bases his theories principally upon the evidence of soil and vegetation. It would appear that there has been a recent lowering of both the uppermost limit of close vegetative cover and of the timber line in Canterbury and Otago. Between latitudes 44° S. and 45° S. a close cover of vegetation ceases at about 6000 feet above sea level and regeneration above this height seems to be insufficient to sustain a close cover against the ravages of geological erosion. Remnants of close cover above this level are, therefore, explained as 'survivals from a previous climatic cycle when the limit of a close cover stood somewhat higher than it does today'—a conclusion which is further supported by traces, between 6000 feet and 6500 feet, of a yellow subsoil 'similar to that at present covering the slopes from 5500 feet to 6000 feet'. Totara logs, found at levels of 4000 feet on the Tasman Downs and Kirkliston Range, where now there is only tussock grassland, suggest that 'at some time in the past the temperature was high enough to raise the timber line at least 500 feet higher than it is now'.

On the grounds that 'increase in the burden of waste indicates increased erosion and decrease suggests a soil surface adequately protected from erosion', the author argues that 'a fall in average temperature might be expected to expose a considerable area to soil erosion as the uppermost limit of vegetation receded down the mountainside'. Where the supply of waste to rivers is great they can be expected to aggrade in their lower reaches, and they will degrade when not overburdened with material. The terrace structure in South Canterbury shows evidence of such alterations in river work and these may be used to point to climatic fluctuations. Mr. Raeside's investigations lead him to suggest fluctuations between a warm, moist climate and a climate that was dry. Evidence for a moister climate in the past is also seen by reference to the soil features of South Canterbury which appear, in many places, to be those of a soil developed under a forest cover in humid times now modified by the grassland humus of a drier period.

Further evidence for climatic change comes from the discrepancies between present soil types and climate. The predominance of greywacke or mica schist and a vegetation of low tussock grassland over much of semiarid Canterbury and Otago suggests that differences in soil type might be closely related to climatic character since the soil-forming factors of parent material and vegetation are so uniform. By applying both Thornthwaite's and Meyer's precipitation-effectiveness schemes to what climatic statistics are available it would appear that climates here favour the development of pedocals in many parts. Soil profiles, even in the driest areas, lack pedocal qualities and display the characteristics of pedalfers, the discrepancy between soil type and climate increasing as aridity increases. Such unconformity may reasonably be explained by suggesting the existence of a more humid climate in the recent past or by climatic fluctuations which have prevented the proper development of pedocalcic features.

Mr. Raeside's general conclusion is that 'the present climate seems to have followed a somewhat warmer and much wetter one', and also, since he is writing as a pedologist, that 'climate . . . should not be regarded as a constant or static soil-forming factor, but rather as a dynamic or constantly changing one, fluctuating between certain extremes of rainfall, humidity and temperature'. His paper deals skilfully with the rather scattered evidence and suggests the need for further research into the problem.

—B. J. GARNIER.

STUDIES IN SOUTHWEST PACIFIC ANTHROPOLOGY

THE DEVELOPMENT OF MAORI CULTURE SINCE THE ADVENT OF THE PAKEHA: J. M. McEwen, *Journal of the Polynesian Society*, Vol. 56, No. 2, 1947, pp. 173-187.

RAROTONGA TODAY: T. R. A. Davis, *ibid*, pp. 197-218.

Mr. J. M. McEwen's article provides a most valuable account of the development of Maori arts and crafts following the arrival of Europeans. Mr. McEwen is well qualified to make this summary for his daily work as an official of the Native Department brings him constantly into touch with the modern Maori. In addition, he possesses a sound knowledge of and interest in the ancient Maori life. He is able therefore to see in proper perspective the changes that have taken place.

In particular he refers to carving and allied arts, weaving, dancing and music. Most space is devoted to carving, and he affirms that credit is due to the Ngati Porou and Arawa tribes for preserving the art from extinction. Patterns employed today often represent a mixture from different tribal areas, but this is not deplored, as it leads to an enrichment of Maori carving. The introduction of new patterns, providing they do not clash with the old, is considered a healthy sign and a clear indication that Maori art is not static but capable of further development.

Inevitably weaving has suffered more from European contact, so from a rich and varied range of textiles only the *piupiu*, *taniko* weaving in an altered form, and the plaiting of ordinary kits seem likely to survive for any length of time. In the sphere of dancing the *poi* dance and two forms of the *haka*—the war dance and the *powhiri* or welcoming dance—show evidence of permanency. The future of music is not bright, owing to the competition from European sources, the 'insufficient knowledge of their language or history' and the scarcity of composers.

Further changes in culture may be expected, but Mr. McEwen considers that 'a substantial proportion will survive' and ultimately attach itself to the European culture of New Zealand, thus providing a very real contribution to the nation's cultural development. It is to be hoped that Mr. McEwen will provide further illuminating studies of his research into similar problems.

Increasing interest is being displayed in the Cook Islands, hence the publication of the second article listed above and written by a resident medical officer, who is himself part Rarotongan, proves a welcome contribution as a statement of modern conditions. Dr. Davis prefaces his remarks by devoting several pages to an examination of the structure of Rarotongan society in the pre-European period.

The destruction of the old system is attributed first to the missionaries and finally to various administrators after 1888. Recent legislation empowers the people to elect their own representatives for the native governing authority, an experiment from which interesting results are expected to follow. A rapid increase in population in recent years is a healthy sign for the future of the people. Attention is centred on the poor diet lacking in protein as an important contributory factor to poor health. Education is not of an advanced character and ceases at grade IV.

In his own special field Dr. Davis deplores the state of health and comments adversely on the low standard of hygiene. Filarial infection and tuberculosis constitute a problem. Regret is expressed that administrative officers are not required to undergo any special training to equip them for their duties. Finally, the view is expressed that the Cook Islander is capable of adapting himself to western civilisation, is in fact aiming at this now, but requires a higher educational standard; consequently it is wise to make haste slowly so far as future reforms are concerned.—V. F. Fisher.

2. *In Overseas Journals . . .*

A New Journal of Pacific Science

JOURNAL DE LA SOCIÉTÉ DES OCÉANISTES, Vol. 1, No. 1, 1945.

Students of the Pacific and of French Oceania in particular will welcome the publication of the *Journal de la Société des Océanistes*, which provides evidence that despite the setbacks of the war years, French scientists are active and are planning to devote considerable attention to French colonial territories. The headquarters of the society are at the Musée de l'Homme in Paris. Both the president of the society, M. Leenhardt, and the secretary-general, R. P. Patrick O'Reilly, are well known for their researches in New Caledonia and the Solomon Islands respectively.

The number commences with references to two savants, André Ropiteau, who died in 1940, and Anatole Lewitzky, who died in 1942. M. Ropiteau, who lived for many years in the Society Islands and was a valued contributor to the *Bulletin de la Société des Etudes Océaniennes*, recorded much ethnographic and historical data relating to the Isle of Maupiti.

M. Leenhardt in his presidential introduction reviews the scope of the society and emphasises the need for further research. M. P. Métais outlines the custom of barter amongst the New Caledonian natives. M. Leenhardt contributes an interesting discussion on the significance of the mask in New Caledonia, prefacing his remarks by a brief résumé of ceremonial masks in other Melanesian areas. H. Breuil examines the palaeolithic stone flakes of the Tasmanians. Two members of the colonial health corps, Lieut. Colonel L. Pales and Commandant C. Chippaux, took advantage of the presence in Paris during 1945 of members of the Pacific battalion to carry out an investigation into certain muscles of New Caledonian natives.

Advocating a careful survey of the Oceanic ethnographic material in French Museums, M. Laroche lists institutions possessing important collections obtained by voyagers and scientific expeditions. Owing to the ravages of war three such institutions, those of Brest, Caen and Douai no longer exist. Dumont d'Urville on his second voyage (1837-1840) made collections in Polynesia, including New Zealand, Samoa, the Society Islands and Tonga, and this material was ultimately deposited in the Caen Museum. Students will regret the loss of such valuable study collections.

Then follows M. J. Berlioz's article on the distribution of birds in the Pacific. M. Jean-Paul Faivre supplies an excellent historical study of Free French activities in French Pacific colonies, particularly with reference to New Caledonia and Tahiti. Referring to the former, he outlines Governor Pélissier's opposition to the pressure of de Gaullist supporters leading to his hurried departure by air. Another Vichy supporter, Colonel Denis, succeeded Pélissier, but his term of office was quickly terminated owing to the continued opposition of the people. The arrival of a commissioner from the New Hebrides, M. Henri Sautot, solved the administrative problems to the satisfaction of the local inhabitants. With his arrival New Caledonia experienced no further internal trouble and supported the Free French cause.

A short article on Australian fibre baskets by M. Jean Guiart is followed by an important contribution on the aerial routes of the Pacific by Lieut. Colonel Max Déné. Tracing the history of aviation in the Pacific prior to the war and of aerial transport during the war, he sums up the economic, technical and political conditions influencing aviation at present. Although this completes the main section of the journal, it is followed by the constitution of the society, notes, reviews and finally forty-four pages of classified bibliography listing books and papers published from 1939 to 1944. This extensive bibliography prepared by M. E. Reitman forms a most important portion of the journal and ready reference is facilitated by further division into main headings ranging from the natural sciences, missions, history, economics, international politics, to art and literature. Students of Pacific geography will find the bibliography of great value.

The society is to be congratulated on the publication of the first number and future issues will be awaited with interest.—V. F. FISHER.

REVIEWS

The Interpretation of Aerial Photographs

AERIAL PHOTOGRAPHS: THEIR USE AND INTERPRETATION. By A. J. Eardley. London: Harper and Brothers, 1942, pp. 372.

AERIAL PHOTOGRAPHS AND THEIR APPLICATION. By H. T. U. Smith. New York: D. Appleton-Century Company, 1943, pp. 203.

THE USE OF AERIAL SURVEY IN FORESTRY AND AGRICULTURE. By J. W. B. Sisam. Aberystwyth: Imperial Agricultural Bureaux, Joint Publication No. 9, 1947, pp. 59.

The value of the aerial photograph to the geographer is the reason for the reviewing of these three works, which are representative of different approaches to the interpretation of such photographs.

The oblique aerial photograph differs in no way, as far as interpretation is concerned, from the ordinary ground photograph with which everyone is familiar. It presents a view from an altitude which will show more of the features of a landscape, but it is still as selective as a ground photograph in that it may emphasise or distort certain features according to its viewpoint. Though the oblique is sometimes of arresting quality, it does not usually present to the geographer the value that the vertical photograph does; this gives a view of the countryside as it appears to the lens of a camera flying vertically above it and is a record of every feature of the landscape, that the camera can see. With ground survey control, and with increasingly more accurate flying and camera levelling, it provides the raw material for detailed topographic mapping. The recent application of radar fixes to survey aeroplanes in flight means that the position of a photograph can now be fixed to within twenty feet. Even greater accuracy will undoubtedly be reached shortly. The speed and accuracy of aerial survey work are of great importance in New Zealand and some notable topographic maps have been the result of such methods here. The Sinclair sheet of the 1:25,000 New Zealand Topographic series even has the location of the principal points of the survey photographs marked on it.

The geographer, however, finds in the aerial photograph a value much higher than does the surveyor. It records for him the landscape as it actually is; the surface expression of the land structure, the surface configuration, the results of soil differences, the vegetation and farming patterns, the record of vegetation changes and soil erosion, the settlement patterns and the transport conditions. Moreover, comparison of verticals of the same areas taken at different times will show significant changes; such photographs have already been used to show the tremendous change in river form undergone by West Coast rivers in recent years and to show farming developments and extension of second growth in the Wairarapa. With the passage of time and the resurvey of New Zealand areas the historical value of our present wide aerial surveys will become more apparent. The overlapping of the prints of vertical aerial surveys also enables the geographer with the use of simple stereoscopes to see the country in relief and to obtain a more realistic view of conditions. Moreover, the building of series of photographs into mosaics provides magnificent photomaps for the consideration of such features as land utilisation and farming patterns. The vertical photograph, then, offering more to the geographer than does the oblique, needs correspondingly more skill in interpretation. The three books listed above all attempt to develop this skill.

Eardley's book is designed for the reader who will not use aerial photographs for surveying, but who is concerned with their interpretation. His introductory section on stereoscopy and the making of simple stereoscopes is admirably clear, as is his account of the making of semicontrolled mosaics. He discusses the making of contour maps only from a network of spot heights determined in the field, and does not mention any stereoscopic plotting apparatus. All this is exactly the type of material required by the geographer. He then lists a chapter, 'Interpretation of Culture'. This turns out to be, however, one photograph and a list of the features shown on it, four pages of text in all. He then plunges into his main interest, the interpretation of geological structures, taking 105 pages and 33 magnificent photographs. From the geographer's point of view the introductory section, then, is the only one of value. Photographic interpretation of matters in which he is particularly interested is not considered at all. The book is admirably produced, and the reproduction of the photographs is excellent.

Aerial Photographs and their Application by H. T. U. Smith shows the same lack of balance. It is a larger book than Eardley's, and goes into more detail with regard to survey methods using aerial photographs, though not enough detail to assist anyone who will work with the simpler plotting machines. It pays very little attention to European survey methods. The book then devotes 109 pages to the geological and physiographic interpretation of aerial photographs, using 60 photographs, many of them stereopairs and triplets. It then dismisses agriculture in eleven lines and no photograph, forestry in sixteen lines and no photograph, and treats city and regional planning, archaeology and general engineering in as cavalier a fashion. Throughout the book no mention is made of geographic matters; indeed, man and his works receive no consideration whatever. The selection of photographs is very good though they are poorly reproduced.

Sisam is concerned first with the efficiency and cost of aerial surveying, and secondly with the interpretation of the photographs. In the section dealing with the latter he discusses in some detail the interpretation from the point of view of forestry. He then considers the air work of some countries as examples of varying methods in land use and vegetation surveys. For the geographer, however, the outstanding feature of the book is the magnificent series of 67 aerial photographs, over a third of them stereopairs, of agricultural and forestry conditions all over the world. They are a unique collection, some of them, like the pair of terraced rice fields in China, of superb quality. New Zealand is represented by two single verticals of the Esk River area showing soil erosion conditions in the upper river and flood conditions in the lower. The photographs are well reproduced.

Both Sisam and Smith illustrate a feature that is now beginning to appear in geographic literature: the printing of stereopairs side by side so spaced that they may be viewed stereoscopically, either by looking at them and allowing the eyes to relax as though looking into the distance, when each eye will see a separate photograph and the brain will compound them into a solid picture of the landscape; or by the use of a simple lens stereoscope, though in this case the screen of the half-tone block may appear troublesome.

None of the three books, then, succeeds in helping the geographer in his study of purely geographic phenomena recorded in aerial photographs. Though each is admirable in its own field, that field is on the fringes of geography.—D. W. McKenzie.

Studies of Otago

THE FACE OF OTAGO. Edited by B. J. Garnier. Dunedin: Otago Centennial Historical Publications, 1948, pp. 82.

It was a timely thought on the part of the Otago Branch of the New Zealand Geographical Society that the centennial history of Otago should be accompanied by a volume dealing with the present-day geography of the province, and the title, *The Face of Otago*, as an indication that the purpose of the book was to present a picture of the province, was a most happy choice. In any circumstances, however, the description of landscape so as to convey a picture of what it looks like and how it came to look like that is a supremely difficult task, and here the difficulty is accentuated by the great diversity of landscapes and the very uneven amount and kind of material available to the authors. The difficulty is still further increased when several hands are brought to the canvas. Good editing, it is true, can reduce, though it cannot completely overcome, the obvious disadvantages of the symposium, and a high degree of continuity has been achieved by the inclusion as frontispiece of a remarkable block diagram of the whole province by G. C. N. Johnson, by the general treatment of physiography (Cotton), of climate (Garnier), of vegetation and soils (Holloway), by the uniform style of the black and white regional sketch-maps, by population maps and livestock maps of southern New Zealand and by twenty-six quite admirable half-tone plates. Yet the picture as a picture does not emerge very clearly, and in many places only the outlines are suggested, which is perhaps hardly surprising. The editor, indeed, guards himself by his modest description of the work in his foreword as 'elementary and general'. Curiously enough, the strongest impression left on the reviewer is that much of it is difficult reading unless one already has a pretty intimate knowledge of Otago. In Cotton's chapter on the physiography, for example, admirably written as it is, the reader will not find it easy to visualise the areal distribution of surface form from the author's approach through process. Johnson's block diagram demands an informed imagination for its interpretation, and even some of the regional treatment is not free from sectionalism of topic. In detail a good deal of help could have been given by a closer correspondence of the regional sketch maps with the text. In the Eastern Otago chapter, for example, the Blue Mountains of the text are shown as the Tapanui Range on the sketch, in the Central Otago chapter the Raggedy-Blackstone Range, mentioned as one of the defining blocks, is not shown at all on the sketch, and in the Southland chapter the Hokonui Hills and the Slopedown Ranges, both critical features, are omitted from the sketch. Of many significant omissions from the regional sketch maps, the most striking is that of Clyde from a sketch map that faces a particularly good picture labelled 'a view near Clyde'! Larger scale sketches of smaller areas would have been a further improvement—Garnier's sketch of the irrigation districts near Alexandra is a valuable, but solitary, example. The Southland chapter in particular needs more illustration as an aid to the appreciation by the less initiated of its considerable amount of good material. All in all this is a creditable first attempt. It leaves very much to do, but it has set the ball rolling, and it should stimulate further and more detailed local investigations in Otago as well as emulation in those less fortunate provinces north of the Waitaki.

—R. Ogilvie Buchanan.

Habit and Habitat

INSTITUTE OF BRITISH GEOGRAPHERS PUBLICATION No. 12: 'SOME PROBLEMS OF SOCIETY AND ENVIRONMENT'. By H. J. Fleure. London: G. Philip and Son Ltd., 1947, pp. 37.

At the dawn of the atomic era it is probably desirable to do a little social stocktaking. Professor Fleure's three lectures may be regarded as part of that introspection in which society (or at least that portion of it which thinks) seems to be indulging just now.

The first lecture deals with 'Population and Environment'. In this Professor Fleure endeavours to show connections between certain physical attributes of human beings, especially skin colour, and different types of climate; he then goes on to survey the world's peoples and to relate their distribution and rates of growth to the capabilities of various world environments and the mode of occupance and habits of the people therein. Much of his discourse is worthy of an Ellsworth Huntington or a Griffith Taylor. It comes strangely from the pen of Professor Fleure to read that 'the long periods of moist heat in West Africa, and of dry heat in other parts, hamper thought and promote dependence on custom, with the accompanying tyranny of witchcraft'. Yet one cannot accuse him of undue environmental determinism since he frequently qualifies his statements as when he says: 'In all this field of enquiry it is important to have in mind the fact that nature is not committed to a single response to a particular stimulus . . . . . . The infinite variety of nature is a cardinal fact.'

'Social Organisation and Environment', the second lecture, deals with human settlement forms and the factors which have given rise to them. This account ranges the world and brings together a tremendous amount of information. One might note particularly the emphasis upon the effects of occidental city forms in monsoon Asia where the author uses a nice turn of phrase in describing the rise of Calcutta, Bombay and Madras as 'turning India inside out'. Europe is covered in some detail, special attention being paid to the contrasts between the Mediterranean, France, and the rest of Europe. Oversimplification, due no doubt to lack of space for so vast a topic, tends to produce, as in the first lecture, a dogmatism which is probably not intended.

The third lecture deals with 'The Common Measure and the Common Multiple Among Men'. This is probably the most important of the three. Professor Fleure has always shown sympathy towards his fellow men and his impassioned plea for 'the study of peoples as thinking social beings' is characteristic and timely in a materialistic and overmechanised age. He lays great emphasis on the desirability of studying that common measure which, in various communities, creates unity out of diversity. 'The study of the common measure among peoples is a matter to which too few students have given attention. Nor have we tried sufficiently to see how it could be increased and the risk of war thereby diminished.' He examples the lecture by discussions on Switzerland, France and the United States.

Taken together these lectures form a trinity worthy of serious notice. It cannot be said that the author has brought to light any striking new facts or promulgated thoughts not before expressed. But he has put old wine into new bottles and it tastes all the better for the change. This reviewer is in hearty agreement with Professor Fleure when he says 'almost down to our own day there are still attempts to subdivide mankind into classes called races, whereas the more profitable line of enquiry is into the relations of particular individuals to particular environments.'—B. J. Garnier.

Hawkes Bay Soils

SOILS AND SOME RELATED AGRICULTURAL ASPECTS OF MID-HAWKE'S BAY. New Zealand Department of Scientific and Industrial Research *Bulletin No. 94*. Wellington, 1947, pp. 176.

After a long lapse this bulletin renews the series on the soils and agriculture of New Zealand. As such, it gives a welcome indication that the valuable work of the Soil Bureau will soon be available in published form. The bulletin deals with some 3000 square miles of mid-Hawkes Bay with the exception of the Heretaunga Plains which have already been described in *Bulletin No. 70* of this series. The area covered extends from Waipukurau in the south to Tangoio in the north and from the coast to the inland mountain ranges.

Chapter I is devoted to a brief general geographic description, while Chapter II, entitled 'Soil Forming Factors' deals with the climate, relief, lithology and vegetation. The region contains six well-defined physiographic units: Northwestern Ranges and Plateaux; Western Ranges; Western Foothills; Coastal Hill Country; Eastern Plains and Flats; and Western Plains and Terraces. The rainfall zones are reflected in the range of plant associations which extend from the podocarp and beech forest of the inland ranges through the tussock grasslands to the peat swamps of the river valleys, and over to the coastal forest, low scrub and grasslands.

Throughout New Zealand the diversity of parent soil-forming materials, with the wide range of climatic conditions and of vegetation, has produced a veritable mosaic of different soil series within a small area. Mid-Hawkes Bay is no exception and in the area covered in this bulletin no less than sixty-eight separate soil series and many more textural types are recorded.

These series fall into eight major groups: the rendzinas, yellow-grey loams, yellow-brown loams, pumice podsolics, recent soils, meadow soils and organic soils, the main features of which are outlined in a chapter on soil classification. It would have been to the advantage of the bulletin if the general features of each main group had been carried over to the next chapter and used as an introduction to the soil series in each group. Such a procedure would have divided more definitely into related groups the long list of soil series and would have made possible a more direct tie-up of the agriculture to the soils. This chapter also includes much technical data which could have been transferred to the appendix.

Chapter IV deals in two sections with the soils and agriculture of the area. The soil type descriptions are clear and adequate while the profile reports and notes on distribution are valuable. This section, when taken in association with the excellent soil maps, is well done. The soil type descriptions include very restricted references to agriculture. These are given mainly in a separate section and are very generalised and not well related to soil types or series. The lack of tie-up between the agriculture and the soil types appears to be the penalty of divided authorship and is the major weakness of the bulletin. In vain does the reader look for any references to the suitability of various soil types to specific crops or for references to the productivity of soil types in terms of crop yields or carrying capacities. Provided the reader recognises that the information on crops and pastures is very general, this section will be of wide interest.

The most valuable information in the section on agriculture is summarised in Table XI where are listed responses of pastures on many soil types to fertilisers applied as topdressing, and in Table XV where are detailed the agricultural properties of the soils. Both tables should have been presented as appendices.

Hawkes Bay provides a museum of types of erosion and of the problems of stream siltation and flooding which accompany them. The bulletin concludes with a timely chapter on these aspects in which the effects and the distribution of the various types of erosion are discussed and correlated with soil types.

The bulletin is an unusual combination of highly technical and finely drawn descriptions of soil types with broad general statements on the geography, climate, vegetation and agriculture of the area covered. The arrangement is not wholly successful and the bulletin would have gained in clarity and value if the land utilisation and farm management aspects had been extended and more directly related to groups of associated soil series. There are many illustrations which have been taken from excellent photographs but the reproduction is so poor, because of the low grade paper used, that they have lost much of their value.

This publication represents another stage in the development of bulletins wherein soil types and land use will be fully coordinated. It has much information of interest to the teacher and the geographer.—M. M. Burns.

The Fate of the Kauri

THE WAIPOUA KAURI FOREST OF NORTHERN NEW ZEALAND.

By W. R. McGregor. Auckland: 1948, pp. 80.

First discovered by Marion du Fresne at the Bay of Islands in 1772, the kauri forests of New Zealand played an important part in the development and settlement of the new country. Rapidly becoming recognised as one of the premier commercial timbers of the world, the kauri was subjected to appalling and unrestricted exploitation. Little attempt was made to control milling, to protect remaining resources against fire or to preserve a virgin area for posterity until 1909. By then the only remaining area of any size was the Waipoua State Forest which was purchased from the Maoris in 1876 and finally defined in 1906. The government of the day planned to let it remain 'in a state of nature for all time' and, even after the setting up of the State Forest Service about 1920, it was generally felt that the kauri in Waipoua would remain inviolate. But since 1923 timber has been removed in considerable quantities from some areas and licences have been issued to private individuals to split posts and take kauri gum. No serious inroads on the kauri of the forest proper were made until 1943 when, under the pretext of war emergency, the government commenced large scale felling of green timber. The Forest Service planned to place Waipoua under 'forest management', a policy which involves the removal of kauri trees of a greater diameter than 33 inches and an attempt to encourage the regeneration of seedling trees. Once the public realised that this policy meant inevitably the alteration, if not the destruction, of the last remaining plant association of its kind in the world, efforts were made to have exploitation stopped and to persuade the government to declare Waipoua a national park.

For good reasons, Mr. McGregor has been the spearpoint of the movement. As a scientist he has studied Waipoua for nearly thirty years and knows its vegetation and its ecology better than any other; as an ardent lover of trees he wishes to preserve for others the aesthetic values of giant kauris and the associated vegetation; as a conservationist he believes that to make of the area a national park is the only way we can ensure its survival in a state as nearly as possible akin to that in which nature fashioned it. Believing that the fate of the Waipoua Forest depends 'not so much upon the decisions of "experts" and officials and governments as upon the will of the people', he has written this brief description of the forest and summarised what he believes to be the essential facts that bear upon its permanent preservation.

The interest of the book for the geographer would probably be under the heading of land usage. The present policy is that the land should be exploited for its timber and attempts made to find a way by which it may produce kauri timber on a basis of management. (In the process the natural forest must inevitably suffer destruction.) The proposed policy, the dedication of the area as a national park, would permit its use in perpetuity for scientific, cultural and recreational purposes. Mr. McGregor's thesis is that it cannot possibly be used in both these ways, and every page of the book and every one of the fifty odd photographs supports his contention. He shows clearly the harm which has been done by roading and logging. 'To fell a forest giant and drag away its carcase is to liberate a vicious circle of destructive forces that multiply the initial damage an hundredfold'. . . . . 'Directly destroying or injuring the vegetation, opening the forest canopy to the inroads of the destructive winds, exposing the soil to erosion, this labyrinth of open roads is responsible for a destruction which is, in the aggregate, positively colossal.' . . . . 'The forest is now, for the first time in its history, exposed to the very gravest of perils from fire, not because of the few dead trees that may be scattered throughout its vastness, but directly as a result of recent logging operations.'

The author draws attention to the present absence of knowledge of how a kauri forest could be preserved by a managed process of natural regeneration and contends that it is only in the unimpaired forest that the necessary ecological information can be obtained and the problem effectively solved. Most people would agree with the views put forward in conclusion:

'If the demand that the Waipoua Forest shall remain inviolate should prove to be wrong, then, ten or twenty years hence, when the error is apparent, no great harm will have been done, for the forest, still intact, will remain to serve perhaps a wiser generation.

If, however, the State Forest Service should be permitted to proceed with its disfiguring and cumulatively destructive operations, and its theories, which today have such slight basis in demonstrated fact, should prove to be entirely wrong, then, indeed, the tragedy will be complete and the damage irreparable.'—L. W. McCaskill.

Farming Canterbury's Lighter Land

LAND UTILISATION ON ASHLEY DENE FARM: SURVEY OF WORK DONE 1937 TO 1946. By R. H. Bevin. Christchurch: Lincoln College, 1946, pp. 48

This publication gives details of the work that has been carried out on the Ashley Dene portion of the farm. There is a description of the working of the area prior to 1937, and the bulletin goes on to describe and discuss the modified form of management adopted during the period 1937 to 1946. It gives details of the change-over from horses to tractor and the financial consideration involved, of pasture mixtures, of the establishment of subterranean clover and of the management of the ewe flock.

The farm is some 878 acres in extent and of this some 500 acres are what could be described as fairly typical of the lighter plains land of the Burnham, Te Pirita, Winchmore, and the Hinds-Ealing portions of the Canterbury Plain. Some of the 500 acres is perhaps better than the areas mentioned but nevertheless they all would lend themselves to the type of management described. Present day trends are towards greater production, and as a considerable portion of the Canterbury Plain is made up, in varying degrees, of this type of country, even moderate improvements in its management would bring about a greater production. So to those who are farming this type of land, this publication should be of interest, and no doubt it would be found that certain of the methods used at Ashley Dene can with advantage be adopted, possibly with some modification, but without in any way upsetting the general programme.—C. C. Leitch.

The U.S.S.R. Today

SOVIET LAND. By G. D. B. Gray. London: Adam and Charles Black, 1947, pp. 316.

The need for the dissemination of facts concerning the people of the U.S.S.R. is most urgent. Unfortunately factual information on the U.S.S.R. has not always been readily available to English-speaking students, but in his *Soviet Land* Mr. Gray, an English training college lecturer in geography, and formerly a teacher of geography in an English secondary school, has succeeded in presenting a 'body of facts' for the senior secondary school pupil and university student. Mr. Gray specifically states that no claim is made that this book goes beyond the factual information which is to be found in the standard accounts of the U.S.S.R. and Russia; but it is obviously written from first-hand knowledge of at least some parts of the U.S.S.R. The subject has been treated as an entity, instead of as partly Asia and partly Europe. Moreover, just as the arbitrary man-made boundaries to the north and south of U.S.A. make that political unit an entity, so do the borders of the U.S.S.R. make this vast political unit one, and no geographer can neglect such political boundaries.

The first part of the book is a description of 'the natural surroundings in which man first made his home'. It attempts nothing but this; and in doing it, makes no reference to the activities of man. Excellent regional maps are given of the chief physical regions and climatic types, with specifically Russian examples to elucidate some general principles of earth sculpture and climate. These are followed by maps and descriptions of soil regions, and the natural vegetation. The author concludes this first part with the following statement, which illustrates his skilled treatment of the geography of the area: 'He [man] has altered the soil, he has cut down the forests, ploughed up the grasslands and irrigated the deserts. He has left his mark on the land surface, and it now remains to examine how and where he lived in the past and to describe his work and activities at the present time'.

Then follows an account of the history of the peoples of the U.S.S.R., beginning with the Stone Age and the great migrations outwards from Sir Halford J. Mackinder's 'Heartland', and bringing the story up to 1928, which year 'brought with it the beginnings of present day distributions of people, industries and agriculture'. It is a fascinating story, explaining as it does the present distribution within this multinational state of the 189 different nationalities with their 151 different languages: 'a nation of varying ethnic types, of different languages, of different religions, having different customs and habits. . . . They held together and died for the U.S.S.R.'. It is the story of the Russians, the largest group; it is the story of the Nganasan people who have been passing through the cultural development of 7000 years in about seventeen years; it is the story of Jews and gypsies, of two thousand Eskimoes and of two million Armenians; all using their local language in their local schools, with Russian as a second language.

The major part of the work, Part III, is an account of the present day landscapes of this sixth of the earth's land surface. It tells of the twenty million peasant families organised into collective farms; each family with its 'homely cottage'; each farmer keeping the money he earns, owning his house and furniture, and with the right to a small plot of land attached to his house, but sharing the cattle, implements, seed supplies and farm buildings. There are two million workers employed in state farms, having the same status as workers in factories. Millions of others produce tractors, combine-harvesters, farm implements of all kinds and fertilisers; thousands of scientists evolve new varieties of seeds and plants to extend the area under crops; technicians irrigate and drain; research institutions improve stock and produce new industrial crops. Coal, oil and electricity, iron and steel, minerals and timber, fishing and furs, textiles and railways, icebreakers and airways; these are topics described as they are found in the Soviet Union; and the story is concluded by brief accounts of house types, of the distribution of the population and of the greater industrial areas. The reader closes this book with a feeling of satisfaction that here is an account of the U.S.S.R. that he can with confidence pass on to others.

The value of the book is greatly increased by the numerous well-reproduced illustrations, maps, sketches and statistical diagrams, all depicting clearly and simply the topic or area under discussion. No map attempts too much, statistics are in most cases shown by the pictorial-unit method, and each crop is clearly illustrated by a novel type of diagram. Above all, the author has succeeded in the difficult task of making the people and landscapes alive, behind the factual information which makes up the text.—J. L. HEWLAND.

Geography from Pictures

NEW ZEALAND GEOGRAPHY IN PICTURES. Photographs selected by F. R. G. Aitken; introductory notes by B. J. Garnier. Wellington: Schools Publication Branch, N.Z. Education Department, 1948, pp. 46.

The need has long been recognised for photographs in the teaching of geography, and for satisfactory methods of discussing them with a class. Such discussion is made possible by having the picture projected on to a screen, or by having a class set of each picture so that each member of the class has a copy in front of him. This admirable selection of photographs, taken throughout New Zealand, fulfils this long-felt need and is therefore a most welcome addition to the growing list of excellent publications produced by this branch of the Education Department. The photographs selected cover most of the important activities of New Zealand's people, and offer an excellent medium for the study of the features characteristic of the different regions of the dominion. Some are of single farm units and serve to make more vivid a study of a small area; others are airviews of larger sections of such areas; and there are several valuable ground views giving more detail and making possible a closer study of the areas they illustrate. The selection of these forty photographs must have entailed much searching, and the result achieved goes far to fulfil the requirements of the teacher who is endeavouring to follow present trends in the teaching of geography.

In discussing this collection, however, it would seem appropriate to repeat the warnings given by Dr. Kenneth B. Cumberland at the Teachers' Refresher Course in Geography held at Waitaki Boys' High School at the beginning of this year. Dr. Cumberland pointed out that by their very nature air photographs could depict objects of a geographic nature only on a very small scale; and the smaller the scale the less 'real' and 'vivid' the picture. Teachers are fortunate that *New Zealand Geography in Pictures* contains some excellent examples of oblique views taken from reasonably low altitudes; in fact it would appear that the selection has been made with due regard to the above warnings, especially in view of the fact that no vertical air photographs have been included. Such views are usually dull and lifeless in comparison with the more attractive topographic map.

A second warning given by Dr. Cumberland was of the danger of using photographs to test a pupil's power of reasoning, for 'reasoning' soon becomes 'guessing'. Besides assisting in the study of the geography of an area, a picture encourages and extends the child's powers of observation and of description. To make the picture explain why is to persuade the pupil that he is competent to examine a photograph (or map) and find a simple solution to all sorts of questions, the answers to which are not in the picture. In view of these warnings against encouraging guesswork by asking for explanations instead of observation and description of what the picture actually shows, some of the questions attached to the pictures in this publication are open to criticism. However the questions are intended only as suggestions, and in most cases can be of great assistance in the use of the pictures.

It would seem that the photographs could have been of even greater assistance had the location of each been given with it. Because this has been omitted, the first thing any reader does is to start guessing their location. This is hardly the purpose in the use of air photographs, which, as has been pointed out above, is to teach geography and to train the powers of observation and description, rather than of reasoning by introducing information not given in the picture. Unfortunately this particular 'guessing game' has become a serious matter in recent years to candidates offering geography for the School Certificate Examination, and the idea has become prevalent that air photographs are most valuable for testing purposes, the main aim being to guess the correct location. It is therefore perhaps unfortunate that so much stress has been laid on this aspect in the introduction to this publication. The introduction also lays stress on 'analysing' the picture and on deducing facts that are not illustrated. It would seem to have been written to help candidates to deal with the usual type of question accompanying pictures set in recent School Certificate Examinations in geography, rather than to show them how to use air photographs in their study of the subject in the classroom.

Teachers in New Zealand have nevertheless welcomed with much enthusiasm this collection of photographs. With enough copies to place one before each pupil, and with the location of each picture supplied (see *Education*, Vol I, No. 2, April, 1948), teachers have one of the best possible visual aids in the teaching of New Zealand geography.—J. L. HEWLAND.

SOCIAL STUDIES

NEW ZEALAND COMMUNITY. By F. G. Spurdle. Christchurch: Whitcombe and Tombs Ltd., 1947, pp. 169.

This book has for its sub-title, 'An Integration of Geography, History, Civics and Elementary Economics'. However, there is not much geography in the book except for a little economic geography in the chapters on farm and factory production and on population. From this point of view it illustrates the tendency of the new subject, Social Studies, to neglect geography. The author explains in the foreword that he has selected topics which no other textbook seems to cover, and he presupposes that pupils are already broadly familiar with the geography and history of New Zealand.

The first part of the book deals with topics 'near at hand' such as health, apprenticeship, trade commission and local government. The second part considers national topics such as farm production, marketing and trade, money and credit, and national defence.

Each short chapter is followed by an excellent list of suggestions for things to do and topics to discuss. The book is likely to be very useful for fourth, fifth and sixth forms of post-primary schools. The author does not intend it as a textbook, but it would provide a very good course for half a year for second year non-academic classes in technical schools.—W. B. HARRIS.

NOTICE TO MEMBERS OF THE SOCIETY AND SUBSCRIBERS TO THE *NEW ZEALAND GEOGRAPHER*

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THE NEW ZEALAND GEOGRAPHICAL SOCIETY

The New Zealand Geographical Society was founded officially in Wellington towards the end of 1944. Its real foundation, however, took place in Christchurch in 1939 when a group of enthusiasts formed what is now the Canterbury Branch of the Society. Their lead was followed in February 1944 in Wellington, and further branches came into being in Auckland and Dunedin early in 1945.

The aims of the Society as stated in the constitution are 'to promote and stimulate the study of geography'. These are the aims of more than one society in the world, and the New Zealand Geographical Society is particularly concerned with geography in New Zealand. It is therefore the Society's policy to stimulate geographical studies about New Zealand and matters closely related to the Dominion.

The Society undertakes the publication of a journal which at present appears twice a year. Branches of the Society organise lectures, study groups, and excursions, and encourage their members to prepare matter for publication in the Society's journal, the *New Zealand Geographer*. Contributions from overseas writers and those who are not members of the Society are also encouraged.

The Society also publishes half-yearly the New Zealand Geographical Society's Record of Proceedings of the Society and its branches, known as the *Record*. This, in addition to summaries of addresses given to branches, contains book reviews, film reviews, and contributions of a lighter nature than those appearing in the *New Zealand Geographer*.

Selected articles from the *New Zealand Geographer* are reprinted and issued separately in the *Reprint Series*. Those that have so far been made available in this form are *Weather Forecasting in New Zealand*, by Ian E. M. Watts, reprinted from *New Zealand Geographer*, Vol. I, No. 2, Oct., 1945; *Literature and Landscape in New Zealand*, by Alan Mulgan, reprinted from Vol. II, No. 1, April, 1946; *Manufacturing in New Zealand: Its Outstanding Characteristics*, by J. L. Hewland, reprinted from Vol. II, No. 1, April, 1946; *Land Utilisation in Metropolitan Christchurch*, by F. Parks, reprinted from Vol. II, No. 2, Oct., 1946; and *The Importance of the Land: The Future of New Zealand Agriculture*, by Kenneth B. Cumberland, reprinted from Vol. III, No. 2, October, 1947.

The Council in 1947 decided to proceed with the publication in book form of a series of *New Zealand Geographical Society Special Publications*. Moneys have been set aside for this purpose, and as material of high quality and real value becomes available it will be published.

Membership of the Society is open to all persons interested in the aims of the Society. Full details of membership will be sent on request by the Secretary, New Zealand Geographical Society, Department of Geography, University of Otago, Dunedin, N.1.

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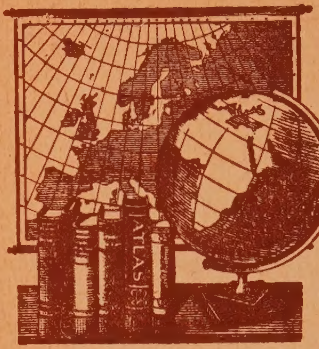

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